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L'EXPLORATION DE LA MER

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QUINZIÈME RÉUNION
COPENHAGUE — SEPTEMBRE 1922

BUREAU DU CONSEIL

M. H. G. Maurice, Président du Conseil.
M. Otto Pettersson, Vice-Président du Conseil.
M. J. Hjort, Vice-Président du Conseil.
M. T. Tissier, Vice-Président du Conseil.
M. F. Drechsel, Secrétaire-Général du Conseil.

MEMBRES DU CONSEIL ET EXPERTS
et leurs adresses

Belgique: M. G. Gilson, Professeur, Directeur du Musée Royal d'histoire naturelle de Belgique, *Bruxelles.*

M. A. Hamman, Président du Comité de Mariculture, Membre du Parlement Belge, Rue longue 60, *Ostende.*

Danemark: M. le Commandeur C. F. Drechsel, *Copenhague*, Jens Kofodsgade 2.

M. Martin Knudsen, Professeur à l'Université, Polyteknisk Læreanstalt, *Copenhague.*

Experts: M. le Dr. A. C. Johansen, Jens Kofodsgade 2, *Copenhague.*

M. F.V. Mortensen, Directeur des Pêches, Vestmannagade 1, *Copenhague.*

M. le Dr. C. H. Ostenfeld, Professeur au Collège Royal d'Agriculture, Sortedamsdossering 63 A, *Copenhague.*

M. le Dr. Johs. Schmidt, Directeur du Laboratoire Carlsberg, Section de Physiologie, *Valby*, *Copenhague.*

Finlande: M. le Dr. R. Witting, Professeur, Directeur de l'institut finlandais pour l'exploration de la Mer (ou Directeur de "Merentutkimuslaitos"), *Helsingfors.*

M. le Dr. T. H. Järvi, Directeur des Pêches (ou Directeur de "Kalastushallitus"), *Helsingfors.*

France: M. Théodore Tissier, Président de section au Conseil d'État, Président du Conseil d'Administration de l'Office scientifique et technique des Pêches maritimes, 13, rue Monsieur, *Paris.*

M. George Lecourbe, Directeur du service des Pêches maritimes et du Personnel central au Sous-Secrétariat d'État de la Marine Marchande, 24, rue du Boccador, *Paris.*

Experts: M. le Professeur L. Joubin, 55, rue du Buffon, *Paris.*

M. le Dr. Ed. le Danois, 3, avenue Octave Gréard, *Paris.*

Grande Bretagne: Mr. H. G. Maurice, C. B., Fisheries Secretary, 43, Parliament Street, *London.*

Professor D'Arcy W. Thompson, C. B., F. R. S., The University, *St. Andrews.*

Experts: Mr. J. O. Borley, O. B. E., Fisheries Laboratory, *Lowestoft.*

Mr. A. Bowman, D. Sc., Fishery Board Laboratory, *Aberdeen.*

Mr. D. T. Jones, C. B. E., Chairman of the Fishery Board for Scotland, *Edinburgh.*

Mr. J. R. Lumby, Fisheries Laboratory, *Lowestoft.*

Mr. Lyon Mackenzie, K. C. Sheriff, Deputy Chairman of the Scottish Fishery Board, *Edinburgh.*

Mr. E. W. Nelson, Scientific Superintendent, Fishery Board for Scotland, *Aberdeen.*

Dr. E. S. Russell, Director of Fishery Investigations, Fisheries Laboratory, *Lowestoft.*

Mr. Buchanan Wollaston, Fisheries Laboratory, *Lowestoft.*

Irlande (Invités): Mr. G. P. Farran, Inspector of Fisheries of Ireland, 3, Kildare Place, *Dublin.*

Mr. R. Southern, Inspector of Fisheries of Ireland, 3, Kildare Place, *Dublin.*

Norvège: M. le Professeur Johan Hjort, à l'Université, *Christiania.*

*M. Einar Lea, Fiskerikonsulent, *Bergen.*

* N'a pas assisté à la réunion de Copenhague.

Pays-Bas: *M. le Dr. E. van Everdingen, Professeur à l'Université, Directeur en Chef de l'Institut Météorologique Royal des Pays-Bas, *De Bilt.*
M. le Dr. H. C. Redeke, Directeur du "Rijksinstituut voor Biologisch Visscherijonderzoek", *Helder.*
**M. J. M. Bottemanne, Inspecteur Général des Pêches, *'s Gravenhage.*

Portugal: M. le Colonel F. A. Chaves, Directeur du Service Météorologique des Açores, Ponta Delgada, *Açores.*
*M. l'Amiral A. E. Neuparth, Intendance de la Marine, *Lisbonne.*
Experts: M. le Dr. A. Ramalho, Aquario Vasco da Gama, *Dafundo (Lisbonne).*

Suède: M. le Dr. O. Pettersson, Professeur, Holma, *Lysekil.*
M. le Dr. Gustaf Ekman, Södra Hamargatan 11, *Göteborg.*
Experts: M. le Dr. K. A. Andersson, Directeur du Bureau des Pêches, Kungl. Lantbruksstyrelsen, *Stockholm.*
M. le Dr. H. Pettersson, Docent, *Göteborg.*

* N'a pas assisté à la réunion de Copenhague.
** A remplacé M. le Dr. E. van Everdingen à la reunion de Copenhague.

AGENDA

for the Fifteenth Meeting of the International Council for the Exploration of the Sea.

(Copenhagen, 14th—18th September 1922.)

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1. Opening of the Proceedings, by the President.
2. Report by the General Secretary as to the present participation and the general situation.
3. Administrative Report.
4. Formation of Sections and Committees (Hydrographical, Plankton, Statistical, Limnological and Fish Sections, and Committees dealing with the Plaice, Herring, Baltic, Atlantic Slope and other Atlantic investigations).
5. Final approval of the Accounts for 1920—21.
6. Statement of Accounts for 1921—22.
7. Estimates for the financial year 1922—23.
8. Proposals regarding the adherence and contributions of certain countries.
9. Reports and proposals of the Sections and Committees.
10. Nomination of the Members of the Bureau, the Editorial Committee and the Finance Committee, and of Editors and Conveners.
11. Other business.
12. Conclusion of the meeting.

REPORT

of

the 15th Meeting of the Council.

Plenary Meetings of the Council were held in Copenhagen on September 14th and 18th.

The Committees on Plaice, Herring, Atlantic Slope, Baltic, Plankton, Statistics, Hydrography, Limnology, Cod and Haddock held meetings on 14th, 15th, 16th and 18th September. The Council was, therefore, in session, either as a Council or through its Committees, from the 14th to the 18th of September.

First Sitting: Thursday, September 14th, 1922, at 10 a. m.

The President, Mr. MAURICE, in the Chair.
Present: the members, experts, etc. (vide List p. 5 to 7).

Under **Point 1** of the Agenda, 14th September, the President opened the proceedings in the following words:—

Messieurs, en inaugurant la quinzième réunion du Conseil International pour l'Exploration de la Mer je me permets de vous rappeler que nous célébrons ici le vingtième anniversaire de la naissance du Conseil. C'est en effet en 1902 qu'il fut définitivement établi comme Conseil permanent. A partir de cette date jusqu'au moment actuel, la coopération internationale pour l'étude de la mer n'a été interrompue que par la crise pénible de la guerre. Et je constate que, malgré toutes les différences soit au point de vue politique, soit au point de vue scientifique ou commercial, cette coopération s'est montrée progressivement de plus en plus réelle, de plus en plus pratique et de plus en plus cordiale et, qu'actuellement, il n'existe pas d'autre organisation capable d'effectuer les travaux que nous faisons ensemble.

Néanmoins, pour atteindre au but que nous nous proposons, il faut que nous maintenions et même augmentions nos progrès jusqu'à ce que chaque travail entrepris ait un résultat définitif et que tous les résultats soient coordonnés pour qu'ils

nous permettent d'arriver à prendre des mesures prudentes et pratiques en ce qui concerne l'exploitation rationelle des ressources de la mer.

Depuis la dernière séance du conseil nous avons à déplorer la mort de plusieurs de nos anciens collègues. M. Åkerman a présidé à la première conférence à Stockholm où le Conseil International a pris naissance, Herr Geheimrat Rose était président du Conseil de l'année 1912 jusqu'à la guerre. Pour chacun d'eux le Bureau a pensé exprimer les sentiments du Conseil en envoyant une couronne mortuaire en témoignage de respect et de condoléance.

Par la mort de M. Holt, chef Inspecteur de pêches en Irlande, nous avons perdu un collègue qui, bien qu'assistant rarement à nos séances plénières, était, néanmoins, un puissant appui à nos travaux actuels.

Enfin, nous avons à pleurer la mort du doyen de la science de la mer, ami renommé et généreux des recherches hydrographiques, de Son Altesse Sérénissime, le Prince Albert de Monaco. Le Conseil a été représenté à ses funérailles par le Secrétaire Général qui a posé sur le catafalque de la part du Conseil une couronne mortuaire.

Nous avons à souhaiter la bienvenue à quelques nouveaux participants à nos délibérations.

M. Lecourbe, nouveau délégué de la France, le Conseil vous souhaite la bienvenue comme successeur à M. Naud, dont nous conservons un souvenir des plus agréables et que nous félicitons de son avancement, certainement bien gagné, dans le service de votre pays.

M. Bottemanne, ancien collègue en caractère d'expert, aujourd'hui remplaçant M. le Docteur van Everdingen, nous vous recevons de bon cœur en vous souhaitant la bienvenue.

M. le Colonel Chaves, délégué de Portugal, à l'occasion de la dernière séance du Conseil j'ai exprimé le plaisir qu'a eu le Conseil en vous comptant parmi ses délégués. Ce plaisir s'accentue quand nous vous voyons assister en personne à cette réunion. Nous vous souhaitons la bienvenue et nous attendons impatiemment de nous servir de votre grande intelligence et de votre expérience si renommée et si mure pour avancer nos travaux hydrographiques et maréographiques.

M. le Docteur Ramalho, expert de Portugal, vous êtes le bienvenu. Nous espérons que par vous le Portugal va donner un bon appui au programme du Comité du plateau continental atlantique.

M. Farran et M. Southern, représentants du Free State of Ireland, vous nous êtes bien connus et nous vous recevons avec la plus grande satisfaction comme des hôtes du Conseil à l'occasion de cette réunion.

M. Lumby, vous participez pour la première fois, comme expert, à une séance plénière du Conseil, nous vous souhaitons la bienvenue.

Nous portons aussi la bienvenue à Sheriff Lyon Mackenzie, K. C., Deputy

Chairman of the Scottish Fishery Board, et à M. Raj, Sous-Directeur des pêches en Madras, qui sont présents comme auditeurs intéressés à nos délibérations.

Nous avons à féliciter M. le Dr. Johs. Schmidt de son retour de son voyage prolongé à bord du "Dana". Nous en attendons résultats très importants.

Messieurs, en votre nom à tous j'adresse à M. Roule et à M. Lea l'expression de nos regrets qu'ils aient été empêchés par la mauvaise santé d'assister à cette séance du Conseil et je leur souhaite à chacun un rétablissement rapide et complet.

Enfin, selon notre coutume, je vous propose de nous réunir pour adresser à S. M. le Roi de Danemark un télégramme pour lui rendre hommage et reconnaître l'hospitalité que nous recevons dans son royaume.

Point 2 of the Agenda, 14th September (Report by the General Secretary as to the present participation and the general situation).

As regards the present participation the General Secretary gave the following report: At present nine countries are participating in the International Council: Belgium, Denmark, Finland, France, Great Britain, Holland, Norway, Portugal and Sweden.

Esthonia, Lettonia and Poland attended the last meeting of the Council as visitors. Since that time nothing has been heard officially from these countries.

In accordance with a resolution passed by the Bureau unofficial inquiries have been made through the Danish Foreign Office as to the attitude of the various participating governments with regard to a possible readmission of Germany (see further point 8).

Point 3 of the Agenda, 14th September (Administrative Report).

The General Secretary referred to the copies of the administrative report for 1921—22 (see p. 43) which had lately been circulated to the delegates for correction. The first part of the report was read, and as regards the work carried out by the various countries the General Secretary gave the following summary:

Hydrographical Programme

has been carried out by all concerned. Holland has, however, been confined to surface observations.

Other hydrographical work in addition to the programme has been done by Denmark, Finland, England and Ireland, Sweden.

Plankton Programme.

The recommendations of the Plankton Programme about construction of nets has been reported about by Denmark, Finland, England, Scotland and Ireland.

Statistics.

Belgium, Denmark, England, Scotland and Holland have reported about the work carried out with reference to the recommendations of the Statistical Committee.

Herring investigations.

Denmark, Finland, England, Scotland and Ireland have carried out almost the whole work on the Herring programme agreed to by them.

Norway has done it on a less extensive scale.

Sweden has carried out investigations of the migrations of Herring.

Holland seems not to have carried out any Herring investigations during the year. Point 6 of the programme about races has been agreed to by Holland at the last meeting.

France has agreed to point 1 and 6 of the programme. I have not been able to state from the big French report whether they are carried out or not.

Cod and Haddock.

Denmark, England, France and Scotland have carried out the work in accordance with the programme.

Holland has reported not to have been prepared to carry out any Cod investigations.

Norway has carried out biological statistical Haddock work, but the report does not state to what extent the work refers to the programme.

Sweden has not reported about Cod and Haddock work.

Plaice.

Belgium, Denmark, England, Scotland, Sweden, and to some extent Holland have dealt with the Plaice question, England and Scotland very elaborately.

Atlantic Slope.

England, Ireland and France have carried out an elaborate work.

Baltic investigations.

Denmark, Finland and Sweden have worked in particular on hydrographic Baltic investigations.

Eel investigations.

Denmark, Finland and England have dealt with these investigations.

Limnological work

has been carried out in Denmark, Finland, France, Holland, Ireland and Sweden.

The General Secretary drew attention to the importance of knowing not only what work it was proposed to carry out, but also what work had been carried out according to these proposals, and he was grateful for the reports received. It was, however, very important that the items of the reports should correspond with

the items of the proposals in order to enable him to make a good yearly administrative report.

It was of special importance that the statistical material should be sent to the Bureau as early as possible. The last Bulletin statistique had been held up for a whole year owing to delays in sending in the necessary material.

Point 4 of the Agenda, 14th September (Formation of Sections and Committees (Hydrographical, Plankton, Statistical, Limnological and Fish Sections, and Committees dealing with the Plaice, Herring, Baltic, Atlantic Slope and other Atlantic investigations).

The President suggested on behalf of the Bureau that the following sections and committees should be formed, and that the first sitting of each committee should be opened by the following gentlemen:

Herring Committee	Prof. Hjort.
Plankton Section	— Ostenfeld.
Hydrographical Section	— Pettersson.
Limnological Committee	Mr. Farran.
Statistical Section	Prof. D'Arcy Thompson.
Atlantic Slope Committee	Mr. Maurice.
Cod- and Haddock-Committee	Dr. Russell.
Plaice Committee	— Redeke.
Baltic Committee	Prof. Witting.

The President further suggested that the various chairmen should meet immediately after close of the Council meeting and frame a programme of the times of meetings, which should then be typewritten and distributed as quickly as possible.

Point 5 of the Agenda, 14th September (Final approval of the Accounts for 1920—21).

The General Secretary gave a short explanation about this statement (see p. 44) and reported that the accounts which were now laid before the Council for its final approval had already been audited and found correct by the finance committee, viz: Messrs. Maurice, Hjort, Pettersson, Redeke and Witting. The accounts for 1920—21 were then approved by the Council.

Point 6 of the Agenda, 14th September (Statement of Accounts for 1921—22).

The General Secretary referred to the printed statement distributed to the members (see p. 45) and mentioned that the balance carried forward from 1921—22 till 1922—23 was Kr. 93,753.99.

Point 7 of the Agenda, 14th September (Estimates for the financial year 1922—23).

Postponed to next sitting.

Point 8 of the Agenda, 14th September (Proposals regarding the adherence and contributions of certain countries).

The President stated that the great difficulty which the low rate of exchange caused to some countries, especially to the new Baltic states, was being discussed by the Bureau. The Danish Foreign Office had, at the request of the Bureau, made informal inquiries as to the attitude of the participating countries towards the readmission of Germany. The General Secretary read the following résumé of the replies received as transmitted to the Bureau by the Danish Foreign Office:—

Belgium: — there will not be raised objection to a readmission of Germany.

Denmark:— no objection to a readmission of Germany.

Finland:— will approve of a readmission of Germany.

France:— la France est désireuse de voir le Conseil international pour l'Exploration de la Mer développer le plus possible ses travaux et ses recherches; elle a montré, dans le domaine pratique aussi bien que dans le domaine scientifique, l'importance qu'elle attache à ses travaux et l'utilité de sa collaboration. Elle entend donc, en toute circonstance, ne pas perdre de vue l'intérêt de l'institution internationale à laquelle elle a adhéré en 1920.

Il n'est pas venu à la connaissance du Gouvernement Français ni à la connaissance de ses Délégués que l'Allemagne ait demandé jusqu'ici à être admise dans le Conseil international pour l'Exploration de la Mer. Pour le cas où l'Allemagne formulerait cette demande, les délégués français ont reçu l'ordre de s'abstenir purement et simplement de prendre partie.

Great Britain:— the Danish Ambassador at Hague has by letter of $^{31}/_{5}$ 22 reported to the Danish Foreign Office that he has had a conversation with the British Ambassador at Hague, Sir Charles Marling, who has stated that the attitude of the British Government is that it will not raise objection to a readmission of Germany to the International Council, which was even for some (probably practical) reasons considered desirable, but that the said Government on the other hand — as expressed by the English Fishery Ministry in letter of $^{8}/_{5}$ 22 to Commodore Drechsel — is not "prepared to press the point against decided opposition from other participating countries."

Great Britain: Later:— His Majesty's Government have no objection to the readmission of Germany.

Netherlands:— pas la moindre objection.

Norway:— the position of Norway is that the question regarding Germany's readmission in the first instance must be decided upon between the previously fighting parties, but otherwise Norway will with pleasure see a readmission of Germany to the International Council.

Portugal:— le Gouvernement de la République Portugaise, tout en reconnaissant l'utilité du concours que l'Allemagne pourrait donner aux travaux du Conseil International pour l'Exploration de la mer, et tout en n'ayant pas l'objections à faire sur la réadmission de l'Allemagne dans le sus-dit Conseil, désire s'abstenir de prendre partie sur ce sujet si le Gouvernement français lui est formellement contraire.

Sweden:— would much like to see Germany readmitted to the Council, where it has previously done very valuable work, and is disposed to support a proposal to this effect. In case, however, that such proposal should meet decided opposition from one or from some of the other Powers, it may be taken under re-consideration what attitude properly ought to be taken.

Prof. D'Arcy Thompson inquired whether Germany would have to apply for readmission, to which the President answered that that was so and that the Council had nothing to discuss under this head, before an application was received from Germany and had been considered by the Governments of the participating countries.

Point 9 of the Agenda, 14th September (Reports and proposals of the Sections and Committees).

The President asked the chairman of the various committees to submit the reports of the meetings of the committees to the Bureau as soon as possible after they had been finished, in order that they might be considered by the Bureau and multiplied for distribution.

The meeting was then adjourned.

Second Sitting: Monday, September 18th, 1922, at 3 p. m.

The President, Mr. Maurice, in the Chair.
Present: the members, experts, etc. (vide List p. 5 to 7).

The President, Mr. Maurice, opened the meeting by stating that in accordance with the decision of the first sitting of the Council the following telegram had been sent to the King:

A Sa Majesté le Roi de Danemark
Marselisborg Hof.

Les membres du Conseil International pour l'Exploration de la Mer réunis à Copenhague demandent la permission de témoigner à Votre Majesté leurs sentiments les plus respectueux.

Maurice, Président. Merexploration, Copenhague.

In reply to this the following telegram had been received from the King:

Mes remerciments sincères pour vos aimables paroles.

Christian R.

Point 9 of the Agenda, 18th September (Reports and proposals of the Sections and Committees) (continued).

The President submitted to the Council the report and programmes of the Committees formed at the first sitting of the Council, copies of which had been distributed to the delegates and experts. The said reports and programmes from the following sections and committees were adopted by the Council and are included on the pages stated:

Herring Committee	see p.	24—25
Plankton Section	—	26—27
Hydrographical Section	—	26—27
Limnological Committee	—	30—33
Statistical Section	—	34—35
Atlantic Slope Committee	—	36—37
Cod- and Haddock-Committee	—	38—39
Plaice Committee	—	40—41
Baltic Committee	—	41

In submitting the Report of the Plaice-Committee the President said he hoped the Council would now reach a decision on this subject. The report had been considered by the Bureau, and he wished, on behalf of the Bureau, to propose the following resolution:

The Council has considered the report of the Plaice-Committee (on page 40—41) and finds itself in general agreement with the Committee's conclusions.

The Council is of opinion that there is clear evidence that the plaice fisheries may be seriously depleted by fishing operations and especially by steam trawling and that such depletion had already taken place before the war. As a result of the restriction of fishing imposed by the war the number of plaice of the larger categories in the North Sea greatly increased, but there is already evidence of a decline of the stock resulting from the resumption of intensive fishing.

The Council is convinced that the decline at present in evidence will, if existing methods of fishing continue to be employed without modification, be progressive, and that protective measures of restriction will become necessary in the near future. The Council accordingly recommends that regulations should be framed in accordance with the recommendations of the Plaice Committee, in order that the Governments concerned may be ready to act promptly and in concert, in accordance with the necessities of the case. The Council strongly endorses the advice of the Committee that transplantation of plaice on a large scale should be undertaken. It further concurs in the advice of the Committee that any regulations involving the closure of areas to trawling should be reviewed three years after their inception.

The results both of transplantation and of restrictive measures should be watched and controlled by scientific observations as closely as possible.

In recommending, subject to the above observations, the measures proposed by the Plaice Committee the Council recognises that the enforcement of restrictive measures without the sympathetic support of the industry may present difficulties. Their practicability, however, appears to the Council to be a matter for the consideration of the Governments of the countries concerned. At present no course other than that recommended by the Committee presents itself to the Council as likely to procure the results required.

This proposal was adopted by the Council, and the President congratulated the Council upon the fact that at length they had reached a definite conclusion on this subject, which had engaged so much of their time and attention during the past twenty years.

Prof. Hjort said that there was a general feeling in the Bureau that a few words of congratulation should be addressed to the Plaice Committee on the conclusion of their labours. Belonging to a country which had taken little part in the plaice investigations he was in a position to speak complimentary words. The criticism had often been made during the 20 years of these investigations, that the work was leading to no definite practical results. He thought that looking back upon the development of ideas on this subject they ought to take quite a different view. When the work started, ideas as to the depletion of the fisheries were vague and unsatisfactory; remedial measures like fish hatching were recommended, and many baseless theories were put forward about the exhaustibility or inexhaustibility of the stock. Accuracy and precision had been given to all our ideas by the international investigations of the last 20 years.

It was right in this connection to remember those, who had contributed to this revolution of ideas. First Prof. Garstang, who was the original Convener of the Committee and carried out those valuable experiments on transplantation, and first drew attention to the problem of overcrowding. Then Prof. Heincke, who succeeded Prof. Garstang as Convener and carried out the heavy task of preparing a General Report on the investigations made before the war. Their colleague and friend Dr. Petersen must also be mentioned, whose marking experiments broke new ground and whose analysis of the effects of the intensity of fishing was so valuable.

In spite of the great progress in knowledge and methods achieved by these workers the problem might not yet have been solved, had it not been for the great experiment provided by the war. Great credit is due to the Plaice Committee that they understood the great importance of studying without delay the effect of war conditions. If any name could be singled out in this connection he thought that especial credit should be given to the President, Mr. Maurice, who, representing

a country which had suffered much during the war, had nevertheless had the courage to devise and demand means for carrying out thorough research into these problems. If Mr. MAURICE had not taken up the matter so energetically they would not now have before them this extensive and valuable accumulation of data from England. Also to Mr. BORLEY were due the Council's compliments and thanks for working up the English material in the form of a comprehensive report, to Dr. JOHANSEN for his invaluable investigations of the young plaice population on the Eastern grounds and in the Skagerak, and to the chairman Dr. REDEKE for his indefatigable labours.

It had been most difficult for the Council to arrive at a decision upon this intricate problem, in which were involved both practical and scientific considerations of great complexity. He was glad that the Council had adopted a recommendation drafted on cautious lines. Referring to the last paragraph of the recommendations Prof. HJORT said that it was of the greatest importance to secure the sympathy and support of the industry, and he thought that this could best be achieved by publishing a short account of the investigations and their practical outcome.

The Bureau considered it as highly desirable that a summary and review of the extensive work of the Plaice Committee should be given to the public in readable and popular form, and they proposed that Mr. BORLEY should be invited to prepare such a review, the Bureau making itself responsible for the expenses of publication. Prof. HJORT supported this proposal of the Bureau and hoped that Mr. BORLEY would regard it as a compliment. He assured him that the Bureau would greatly appreciate his undertaking to write the review.

In conclusion Prof. HJORT pointed out that the recommendation of the Council with regard to the plaice did not mean a cessation of the investigations. Work must be continued and the results of any action carefully controlled by scientific observation and experiment.

Dr. REDEKE said that having been the Chairman of the Committee he wished to thank Prof. HJORT for his appreciative statement, as he also strongly wished to support his proposal that Mr. BORLEY should be asked to prepare a popular report; he was of opinion that Mr. BORLEY would be well fitted to take upon himself this task.

The President expressed his cordial congratulations to the Plaice Committee for their great work. With regard to the proposal of Prof. HJORT that Mr. BORLEY should prepare a popular general review of the work of the last 20 years, he explained that the Bureau's intention was that Mr. BORLEY should produce not an official blue book report, but an ordinary book to be read by the public. This work would have to be published by a publisher selected for the purpose, and some sort of guarantee would need to be given to the publisher, i. e. the Council would have to guarantee him against a possible loss.

The Council adopted Professor HJORT's proposal coupled with the proposal of the President regarding a guarantee.

Mr. BORLEY expressed his thanks for the general appreciation of the Council and of Professor HJORT and his indebtedness to the members of the Plaice Committee. He added, however, that the fact that it had been possible for them to turn to account the experience the war had brought was largely due to the work which GARSTANG, HEINCKE and PETERSEN had done before the war. He would willingly undertake the task of preparing a popular review as suggested.

The President stated that the Bureau would suggest that an honorarium of 3000 Kr. should be paid to Mr. BORLEY for this work. The Council approved this proposal.

Professor GILSON asked in what language this Plaice Review should be published.

The President said he thought it should be written in English. If a French translation was desired, this point might be considered when the manuscript was ready from the hand of the author.

Professor GILSON and Dr. LE DANOIS suggested that a summary of it might be published in French. The President suggested that a summary in French would be rather out of place in a popular book of the kind suggested. A French summary might, however, be prepared for the use of the French Delegates and others. It was eventually agreed that Mr. BORLEY and Dr. LE DANOIS should consider, what should be contained in such a French résumé, and submit their suggestions to the Bureau.

With regard to the Report of the Hydrographical Section, Resolution III, it was agreed to ask Dr. LE DANOIS to act as the intermediary of the Council for submitting this Resolution to the American Commission with a view to securing its cooperation.

In connection with the adoption of the report of the Atlantic Slope Committee the President suggested on behalf of the Bureau, that Dr. LE DANOIS should be asked to act as Convener for the said Committee and receive 3000 Kr. in 1922—23 for this task.

Dr. LE DANOIS was willing to take upon himself this work, and the Council accepted the proposal.

The President stated that the fish-section had last year asked Dr. ALLEN to prepare a "Programme of work on mackerel and pilchard." This programme (see page 36—37) had been received, but owing to an oversight on his part had not been dealt with. He proposed that it should be referred to the Atlantic Slope Committee.

The Council agreed that the programme should be handed over to the Convener of the said Committee Dr. LE DANOIS.

The President here mentioned that the Bureau had received from Prof. EHRENBAUM Part II of his Mackerel report, the first part of which was written before the war. This report had now been considered by the Atlantic Slope Committee. Meanwhile, he now recommended that the report should be translated into English and be printed at the cost of the Council which had already published the first part. He further proposed on behalf of the Bureau, that an honorarium of 1000 Kr. should be paid to Prof. EHRENBAUM.

These proposals were adopted by the Council.

Professor PETTERSSON stated that the Swedish delegates had been instructed by their Government to ask the Council to consider the question of the protection of plaice and haddock under certain minimum sizes. This instruction was received too late for consideration of the question in any of the Committees. After discussion it was agreed that the question of haddock should be referred to the Cod and Haddock Committee.

The President referred to a scheme of work on the witch which had been prepared by Dr. ANDERSSON in accordance with the wish expressed by the Council last year. It was agreed that the preliminary investigations of the witch should be entrusted to the Swedish Commission, but that the Cod and Haddock Committee should be requested to keep themselves in touch with the Swedish Commission with a view to furnishing them with any material bearing on the study of the witch, which they might procure in the course of their work.

The President remarked that while considering the reports of the Sections and Committees he also wished to draw attention to the report prepared by the General Secretary, i.e. the "Report of Administration 1921—22", of which draft-copies had been distributed to all the delegates for corrections; he would ask the delegates to return these copies with possible corrections to the General Secretary before end of the month. But if they were not returned, it would be taken as granted that they were agreed to. He would take the opportunity again to impress upon the delegates, that their reports of work done should be submitted in separate paragraphs each referring to the relevant programme or paragraph of a programme adopted by the Council.

Point 8 of the Agenda, 18th September (Proposals regarding the adherence and contributions of certain countries) (continued).

The President communicated to the Council that this point had been considered in five sittings of the Bureau which now wished to submit, and hoped that the Council would accept, certain new proposals for dealing with the case of countries whose financial circumstances owing to a very adverse rate of exchange are such as to impose an intolerable tax if the normal rates of contribution are insisted upon.

It would be remembered that the participating Governments accepted a proposal that new countries might be admitted either in groups or as associates

on certain conditions. This proposal had not, however, found acceptance in the countries concerned.

The Bureau finally came to the conclusion that each case ought to be treated according to the particular circumstances of the country concerned, so that existing difficulties might be met without the establishment of a new normal rate of contribution. It accordingly proceeded to consider individual cases.

In the case of Finland the Bureau proposed that, for the present — that is to say until the finances of the country are in a better state — the contribution they offer of Kr. 5000 should be accepted. The question to be reviewed from year to year.

In the case of Portugal, where great difficulties are experienced, the Bureau proposed that the contribution of Kr. 10000 paid for the current year should be accepted as a contribution for two years, and that the sum of Kr. 5000 should be accepted in succeeding years unless and until the finances of Portugal are in a better condition.

With regard to Esthonia, Lettonia and Poland, which had applied for admission to the Council, but have not pressed their applications on account of financial difficulties, the Bureau proposed that they should for the present be offered free membership — though at liberty to contribute something, if they wished, according to their means — on the understanding that they would vote only on questions directly affecting their own countries.

The Council agreed that these proposals should be recommended to the Governments of the participating countries.

Point 7 of the Agenda, 18th September (Estimates for the financial year 1922—23) (continued).

The General Secretary referred to the draft-estimate for the financial year 1922—23 and stated that the cash balance which in the said estimate had been estimated at 92 000 Kr. after the close of the last financial year actually amounted to Kr. 93 753,99. As for the expenditure he would suggest that item III-12, Expenses of the office in Copenhagen, should be reduced to 12 150 Kr.

The Estimate was then agreed to by the Council as included on page 23.

Point 10 of the Agenda, 18th September (Nomination of the Members of the Bureau, the Editorial Committee and the Finance Committee, and of Editors and Conveners).

According to suggestion of the President the following elections were made and agreed upon.

As members of the Editorial Committee: Prof. Pettersson, Prof. D'Arcy Thompson and Prof. Gilson.

As members of the Finance Committee: The President Mr. Maurice, President Tissier, Prof. Gilson, Dr. Ekman and Dr. Järvi.

As Editors: Prof. KNUDSEN for Hydrography, Prof. OSTENFELD for Plankton, Prof. D'ARCY THOMPSON for Statistics.

As Conveners: Mr. LEA for Herring question, Mr. BORLEY for Plaice question, Dr. LE DANOIS for Atlantic Slope question.

In regard to the Bureau Mr. BOTTEMANNE stated that he felt he would be in agreement with the whole meeting when he proposed that the members of the Bureau should be re-elected. — Applause.

The President replied in saying: Messieurs, Au nom des membres du Bureau je vous remercie de l'honneur que vous venez de nous faire. Ce que nous avons pu faire pour avancer les travaux du Conseil a été fait, comme toujours, de très bon cœur; nous ne pourrions rien faire si nous n'avions l'appui cordial et sympathique que vous nous accordez. C'est en comptant sur la continuation de votre bienveillante activité que nous nous mettons très volontiers entièrement à votre disposition. Messieurs, encore une fois nous vous remercions.

Point 11 of the Agenda, 18th September (Other business).

The President: J'ai à annoncer de la part du Bureau que le Gouvernement de la France a bien voulu nous transmettre par la bouche de notre collègue, M. TISSIER, son invitation très cordiale de nous réunir à Paris à l'occasion de la séance prochaine du Conseil et que le Bureau qui a le devoir de déterminer le lieu et la date de nos séances a accepté très volontiers au nom du Conseil cette aimable invitation. La prochaine séance du Conseil aura donc lieu à Paris vers le commencement du mois d'octobre.

Agreed to with applause.

President TISSIER observed that it would be a pleasure for his Government to receive the Council next year as their guests.

Point 12 of the Agenda, 18th September (Conclusion of the meeting).

Prof. CHAVES expressed cordial thanks to the Council on behalf of Portugal for the kind reception the Council had given the Portuguese representatives who were partaking in the meetings for the first time, and he also wished to cordially thank the Bureau for the remarkable arrangement which had been made in regard to the question of contributions.

President TISSIER wished on behalf of the Foreign and especially the French attendants to express hearty thanks to the Danish Commission for kind hospitality.

Commodore DRECHSEL, President of the Danish Commission, returned thanks to President TISSIER also for the kind invitation to hold the Council meeting next year in Paris.

The President returned thanks to Prof. CHAVES and declared the 15th meeting of the Council closed.

ESTIMATE

of

the International Council for the Study of the Sea for the financial year 1922—23

Receipts:

Head	No.	Items	Kroner	Kroner
I	1	**Cash balance** on 21st July 1922		93 753 99
II		**Annual contributions** of the Governments for 1922—23:		
	2	Belgium	10 000	
	3	Great Britain	25 000	
	4	Denmark	10 000	
	5	Finland	5 000	
	6	France	25 000	
	7	Netherlands	10 000	
	8	Norway	10 000	
	9	Portugal	*)10 000	
	10	Sweden	10 000	
			115 000	115 000 00
		Total Receipts...		208 753 99

*) In accordance with the decision of the Council these 10 000 Kr. cover the two years 1922—23 and 1923—24.

Expenditures:

Head	No.	Items	Kroner	Kroner
I		**Incidental Expenses:**		
	1	President	3 600	
	2	General Secretary	12 000	
	3	Chairman of Editorial Committee	2 000	
	4	Editor for Hydrography	3 000	
	5	Editor for Statistics	2 000	
	6	Editor for Plankton questions	3 000	25 600
II		**Assistance:**		
	7	1st Assistant Secretary	6 000	
	8	2nd » »	4 000	
	9	Hydrographical Department	8 750	
	10	Statistical Department	8 000	
	11	Plankton Department	1 500	28 250
III		**Expenses of the Office in Copenhagen:**		
	12	Rent, service, stationery, books, light, gas, telephone, telegrams, postage, freights, translation, typewriting, minor expenses of meetings, and other expenses	12 150	12 150
IV	13	**Travelling Expenses** of the administrative Staff.....	7 000	7 000
V	14	**Special Resolutions** of the Council (Conveners etc.)	12 000	12 000
VI	15	**Printing** and distribution.....	28 000	28 000
				113 000

Programmes of Committees and Sections adopted by the Council.

Programme of the Herring Committee.

1. The Committee having learnt with regret of Mr. Einar Lea's illness and the consequent delay in preparing his report agrees to his proposal to present this report at their next meeting.
2. The Committee proposes that a Sub-Committee should be convened by the chairman to consider the criticisms of the method of age determination made by Prof. D'Arcy Thompson and Mr. Nelson, this Sub-Committee to meet in England or Scotland at an early date.
3. The Committee refers to the programme of research agreed upon at their meeting in 1921, and having considered the progress made, resolves that work should be continued during the coming year upon the same lines, special attention being devoted to testing methods of age determination.
4. The following note on the southern limit of distribution of the herring was presented by M. le Prof. Joubin:

"La limite méridionale du hareng semble être le Golfe de Gascogne.

On en signale de fréquents atterrissages sur la côte sud de Bretagne et il existe une saurisserie à Port-Navalo (Morbihan); celle du Croisic (Loire-Inférieure) ne fonctionne pas actuellement.

Des harengs ont été trouvés en novembre, l'année dernière, dans le Pertuis Breton (devant La Flotte) et dans le Pertuis d'Antioche:

46°06′ latitude N
1°15′ longitude W. Gr.

Cette latitude semble être la plus méridionale où le hareng ait été pêché.

Laboratoire de la Rochelle le 28. Août 1922.

G. Belloc."

Programmes des Comités & Sections ratifiés par le Conseil.

Programme du Comité du Hareng.

1. Le Comité ayant appris avec regret la maladie de M. Einar Lea et le retard qui en résulte dans la préparation de son rapport, accepte que ce rapport soit présenté à la prochaine réunion.
2. Le Comité propose qu'un Sous-Comité soit réuni par le Président pour examiner les critiques faites par le Professeur D'Arcy Thompson et M. Nelson sur les méthodes de détermination de l'âge des harengs; ce Sous-Comité se réunirait en Angleterre ou en Écosse à une date proche.
3. Le Comité se rapporte au programme de recherches accepté à la réunion de 1921, et après avoir considéré les progrès effectués, décide que le travail sera continué pendant cette année, d'après les mêmes directives; les méthodes de détermination d'âge feront l'objet d'une étude spéciale.
4. Le rapport suivant sur la limite méridionale de la distribution du hareng, était présenté par M. le Professeur Joubin:

"La limite méridionale du hareng semble être le Golfe de Gascogne.

On en signale de fréquents atterrissages sur la côte sud de Bretagne et il existe une saurisserie à Port-Navalo (Morbihan); celle du Croisic (Loire-Inférieure) ne fonctionne pas actuellement.

Des harengs ont été trouvés en novembre, l'année dernière, dans le Pertuis Breton (devant La Flotte) et dans le Pertuis d'Antioche:

46°06′ latitude N
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Cette latitude semble être la plus méridionale où le hareng ait été pêché.

Laboratoire de la Rochelle le 28. Août 1922.

G. Belloc."

Recommendations of the Plankton Section.

1. Since the various countries are able to examine only a limited number of plankton samples it is not considered practical to arrange any definite programme of work. The available workers will be fully occupied in dealing with samples collected in connection with definite fishery problems such as for example, the investigations into the food of the herring.
2. With reference to the standard net proposed in resolution (1) of last year it has been decided that:—
   a) In the interest of economy the length of filtering surface shall be 2 metres instead of 3.
   b) The coarse and fine meshed nets shall be manufactured of silk similar to that made by Messrs. Albert Wydler of Zürich.

      Fine mesh no. 25, 77 strands in 10 mm.
      Coarse mesh no. 3, 23 strands in 10 mm.

   c) The net shall be used with a bucket of which a description will be circulated.
   d) A complete specification of the net will be circulated at an early date.
3. With a view to the formation of a central type collection of plankton organisms at some future date each country is requested to prepare before next meeting a list of those types that they could supply.
4. Attention is drawn to the unsatisfactory state of our knowledge as to the range of variation in the plankton and it is hoped that this important problem will be kept in view.
5. With the above modifications the resolutions passed last year are confirmed.

Programme of the Hydrographical Section.

I. The Section highly estimates the value of the hydrographical investigations, which Director Chaves has carried out in the waters at the Azores in the years before the war. And the Section warmly recommends that a ship be again placed at the disposal of M. Chaves by the Portuguese Government, so that he may be able to recommence his investigations as soon as possible.

II. The Section is of the opinion, that hydrographical investigations along lines from Lisbon to the Azores, and from Cape St. Vincent to the coast of Morocco, will be very valuable. And the Section recommends that such investigations be carried out by the Marine Department of the Portuguese Government.

Recommendations de la Section du Plankton.

1. Étant donné que les différents pays ne pourront étudier q'un nombre restreint d'échantillons du plankton, on ne peut envisager pratiquement d'arrêter un programme défini de travail. Les spécialistes ont un travail suffisant en étudiant des échantillons recueillis en vue de problèmes spéciaux des pêcheries, ainsi par exemple les recherches sur la nourriture du hareng.
2. En ce qui concerne le filet Standard proposé dans la résolution N° 1 de l'année dernière il est décidé que:
   a) par raison d'économie la longeur de la surface filtrante sera de 2 mètres au lieu de 3.
   b) les filets à mailles serrées seront faits en soie analogue à celle fabriquée par M. Albert Wydler, de Zurich.

      Mailles fines N° 25: 77 rangs en 10 mm.
      Maille larges N° 3: 23 rangs en 10 mm.

   c) le filet sera utilisé avec un récipient qui sera ultérieurement décrit.
   d) une spécification complète du filet sera communiquée d'ici peu.
3. En vue de former une collection centrale des types des organismes du plankton, chaque pays est prié de préparer avant la prochaine réunion, une liste des types qu'il peut fournir.
4. L'attention est attirée sur l'insuffisance de nos connaissances sur la valeur des variations dans le plankton et on espère que cet important problème ne sera pas perdu de vue.
5. En dehors des modifications ci-dessus indiquées, la Section confirme les résolutions prises l'an passé.

Programme de la Section Hydrographique.

I. La Section considère la grande valeur des recherches hydrographiques que le directeur Chaves a effectué dans les eaux des Açores, dans les années qui précédèrent la guerre, et elle désire vivement qu'un navire soit à nouveau mis par le gouvernement portugais à la disposition de M. Chaves, pour qu'il puisse recommencer ses recherches aussitôt que possible.

II. La Section considère comme très utile que des recherches hydrographiques soient faites le long des lignes allant de Lisbonne aux Açores, et du Cap St.-Vincent au Maroc. Elle désire que ces recherches soient éxécutées par le Ministère de la Marine Portugais.

III. It is proposed that the Council should endeavour to arrange for the establishment of one or more EKMAN submarine stations for the measurement of the currents in the Florida Strait, by means of the Swedish recording current meter as designed by PETTERSSON & EKMAN. It is considered that a continuous record of the intensity of current at the source of the Gulf Stream over a period of years would be of great practical importance to the fisheries.

IV. It is resolved that the programmes of work outlined in the protocol shall be adopted, viz.:—

1) **Portugal** intends to carry out, if possible, cruises along the following two lines:

Lisbon to the Azores; Cape St. Vincent to the coast of Morocco.

The first line is intended to be worked once every year; the other is to be worked 4 times yearly.

2) **France.** In the next year a line will be worked, from Ushant westwards. This cruise will be repeated 4 times, namely in November, February, May and August. — Further two cruises will be carried out in The Bay of Biscay. The routes of these cruises will not be fixed beforehand, but will each time depend upon the actual hydrographical conditions found, the route of the ship being laid so as to give the most satisfying picture of the state of the sea. — Finally investigations will possibly be carried out in Irish waters, in connection with the Irish investigations.

3) **England:** Temperature and salinity observations will be taken at the surface at the lightships Smiths Knoll, Varne, and Seven Stones, — as before. Observations on the commercial routes will be continued, with the exception of the route Liverpool—Charente; an additional route will be arranged across the North Sea. (The routes thus being: Tyne to Naze of Norway, and Harwich—Hook of Holland, Newhaven—Dieppe, Southampton—Le Havre, Southampton—St. Malo; Fishguard—Rosslare, Holyhead—Dublin; Liverpool—Isle of Man; English Channel—Brazil; English Channel—West Indies).

Further current measurements will be continued at the lightships Smiths Knoll and Varne, as usual. — Finally the research-ship "George Bligh" will make cruises in March and November, to determine the Southern limit of the bottom-water in the neighbourhood of the Dogger Bank.

4) **Scotland** intends to work along the following programme:

Observations of temperature and salinity at representative stations in the Moray Firth, and on the east coast of Scotland will be made during trawling excursions. — On special cruises, undertaken for the delimitation of the spawning areas of the haddock, the physical and hydrographical conditions of these areas during the spawning period will be ascertained by more intensive observations. — Hydrographical observations will also be made in connection with the biological investigations of the herring. — Special cruises will be arranged to determine the direction and flow of the

III. Il est proposé que le Conseil recherche un arrangement pour établir une ou plusieurs stations sous-marines du type EKMAN, pour la mesure des courants du détroit de Floride, à l'aide de l'appareil enregistreur indiqué par PETTERSSON et EKMAN. On considère qu'une inscription continuelle de l'intensité du courant, à la source du Gulf Stream pendant une longue période d'années, aurait une grande importance pratique pour les pêcheries.

IV. Les programmes de travaux suivants sont adoptés:

1) **Portugal.** Ce pays fera si possible des croisières suivant les deux lignes: Lisbonne aux Açores, Cap St.-Vincent au Maroc. La première ligne sera étudiée une fois par an; l'autre quatre fois chaque année.

2) **France.** L'année prochaine une ligne de stations sera effectuée à l'Ouest d'Ouessant, quatre fois par an, particulièrement en Novembre, Février, Mai et Août. De plus, deux croisières seront faites dans le Golfe de Gascogne; les itinéraires de ces croisières ne peuvent être fixés à l'avance mais dépendront des conditions hydrologiques du moment. La route du navire sera tracée de façon à donner une idée satisfaisante des conditions marines. Enfin des recherches seront faites dans les eaux irlandaises, en liaison avec les travaux de l'Irlande.

3) **Angleterre.** Les observations de température et de salinité des eaux de surface seront faites aux bateaux-phares de Smiths Knoll, Varne et Seven Stones, comme auparavant. Des observations sur les routes commerciales seront continuées à l'exception du trajet: Liverpool—Charente. Une route supplémentaire sera mise au point dans la mer du Nord. Les trajets actuels seront: Tyne—Norvège, Harwich—Hook of Holland, Newhaven—Dieppe, Southampton—Le Hâvre, Southampton—St.-Malo; Fishguard—Rosslare, Holyhead—Dublin; Liverpool—Ile de Man; Manche—Brésil; Manche—Antilles.

   De plus, des mesures de courants seront continuées aux bateaux-phares de Smiths Knoll et de Varne. — Enfin le bateau de recherches "George Bligh" fera des croisières en Mars et Novembre, pour déterminer la limite méridionale des eaux de profondeur dans le voisinage du Dogger Bank.

4) **Écosse.** L'Écosse se propose d'accomplir le programme suivant:

   Les observations de température et de salinité à des Stations fixes, dans le Moray Firth, et sur la côte Est d'Écosse seront faites pendant les sorties de chalutage. Par des croisières spéciales, entreprises pour délimiter les zônes de ponte de l'églefin, les conditions physiques et hydrographiques de ces secteurs seront précisées par de très nombreuses observations. — Les observations hydrographiques seront également faites en relation avec les recherches biologiques sur le hareng. — Des croisières spéciales auront pour but de déterminer la direction des eaux atlantiques entrant

Atlantic water penetrating the North Sea, more particularly with regard to their relation to the Scottish herring fisheries. The position of the western boundary line of the cold bottom water of the northern North Sea will be traced as frequently as possible.

5) **Sweden** intends to take care of the Skagerak and the Kattegat, as usual; together with its investigations in the Baltic.

6) **Holland** intends to carry out hydrographical investigations on the same scale as in this last year.

7) **Ireland** will work on the same lines as in the two previous years.

8) **Belgium** will undertake hydrographical cruises in the North Sea between Belgium and England; and on these cruises special attention will be paid to the oxygen contents of the water layers near the bottom.

9) **Denmark** intends to try to undertake serial measurements in the Baltic at Christiansø (comp. the Resolutions of the Baltic Committee). Further current-measurements will, if possible, be carried out at the lightships Schultz's Grund and Halskov, in connection with similar measurements undertaken by Sweden at the lightship Fladen. — The current-measurements at the lightship Horns Rev in the North Sea are to be continued, as well as the surface-observations by commercial steamers on the routes: Esbjerg—Parkestone and Copenhagen—New York.

V. The material for the period 1914—1919 is to be sent in to the Bureau, and collated here together with the material after this period. The total material is to be laid before the next meeting of the Council; and the question of the issue of the Bulletin is to be reconsidered.

The Report of the Atlantic Slope Committee should be published in the "Rapports," and it should be a recommendation to the Editorial Committee, that in respect of charts, sections and tables, the Report should conform to the practice previously followed in the Council's publications.

Programme of the Limnological Section.

The Committee decided to adopt, for the ensuing year, the programme framed at the meeting in 1921, and set out on page 42 of the "Procès Verbaux," Vol. XXVII. Dr. Redeke will continue to act as Reporter of the Committee.

Professor Joubin, on behalf of Dr. Roule, presented the following reports of his observations on *Alosa* and *Acipenser*:—

en mer du Nord, particulièrement en ce qui concerne l'influence de ces eaux sur la pêche écossaise du hareng. La limite Ouest de l'eau froide du fond de la mer du Nord Septentrionale sera indiquée aussi fréquemment que possible.

5) **La Suède** travaillera dans le Skagerak et le Cattegat, comme habituellement. Elle continuera ses recherches en Baltique.
6) **La Hollande** a l'intention de continuer ses recherches hydrographiques dans la même mesure que l'année passée.
7) **l'Irlande** continuera son travail des années précédentes.
8) **La Belgique** entreprendra des croisières hydrographiques dans la mer du Nord, entre la Belgique et l'Angleterre. Dans ces croisières une étude spéciale sera faite de la quantité d'oxygène des couches profondes.
9) **Le Danemark** pense entreprendre des mesures en série dans la Baltique à Christiansø (Résolutions du Comité Baltique). De plus des mesures de courants seront faites aux bateaux-phares de Schultz's Grund et d'Halskov, en relation avec des mesures analogues effectuées par la Suède au bateau-phare de Fladen. — Les mesures de courants au bateau-phare de Horns Rev dans la mer du Nord seront continuées ainsi que les observations de surface des navires commerciaux sur les routes Esbjerg—Parkestone, et Copenhague—New-York.

V. Le matériel pour la période 1914—1919 sera envoyé au Bureau et réuni à celui de la période suivante. L'ensemble sera soumis à la prochaine réunion du Conseil et la question de la publication du Bulletin demande d'être revue.

Le rapport du Comité du Plateau Continental Atlantique sera publié dans les "Rapports", et il est demandé au Comité d'édition que les cartes, les coupes et les tables soient, dans ce rapport, établies conformément aux règles déjà suivies dans les publications du Conseil.

Programme de la Section Limnologique.

Le Comité décide d'adopter pour l'année en cours, le programme tracé à la réunion de 1921, et publié à la page 43 du volume XXVII des Procès-Verbaux. Le Docteur Redeke continuera à être rapporteur de ce Comité.

Le Professeur Joubin présente de la part du Dr. Roule les rapports suivants sur *Alosa* et *Acipenser*:

Professeur Louis Roule. — La Migration reproductrice et la Protandrie d'*Alosa Finta* L. dans le bassin de la Seine.

Les deux espèces européennes du genre *Alosa*, *A. Alosa* L. et *A. Finta* L., peuplaient jadis le bassin de la Seine, et le remontaient au delà de Paris. A la suite de la création des barrages pendant la seconde moitié du XIX siècle, *A. Alosa* a disparu; *Alosa Finta* reste seule, encore assez abondante et confinée dans la Basse Seine pour sa migration, du Hâvre à Elbeuf.

Mes recherches, effectuées en 1920 et reprises pour contrôle en 1921, ont montré que la migration reproductrice commence vers le début de Mai; la fraie a lieu de la fin de Mai au début de Juillet, la température était comprise entre 18° C. et 22° C. Tous les individus sont en état d'élaboration sexuelle; les glandes reproductrices augmentent de volume et de poids pendant le séjour en eau douce, pour aboutir à la maturation et à la fécondation.

Les individus sont de tailles différentes; l'étude des écailles m'a permis de reconnaître que ces différences répondent à d'autres différences portant sur l'âge. Les plus petits individus sont des mâles dont les écailles marquent habituellement 2 et 3 étés, les plus gros sont des femelles dont les écailles marquent le plus souvent 4 et 5 étés. Il y a donc, chez *Alosa Finta* L. dimorphisme sexuel de dimensions, et protandrie.

Professeur Louis Roule. — La Biologie de l'Esturgeon (*Acipenser Sturio* L.) dans les bassins hydrographiques du versant Atlantique français.

A. Sturio était abondant jadis dans la plupart de ces bassins, où on le pêchait pendant sa migration de pente. Actuellement, l'espèce ne remonte avec constance que la Gironde et ses deux affluents principaux, surtout la Garonne, où la montée reproductrice s'arrête à Agen.

La migration de pente commence en Février-Mars et dure jusqu'à Juin; l'élaboration sexuelle s'accomplit au fur et à mesure du déplacement vers l'amont. Les reproducteurs de sexualité mâle sont plus petits habituellement que les femelles; celles-ci dépassent souvent le poids de 30 Kilogs; alors que les premiers se tiennent entre 20 et 30 kilogrammes. La ponte a lieu de Mai à Juillet. La principale région de ponte est représentée par la Garonne en Aval d'Agen, et par la Dordogne auprès de Cubzac.

Les alevins ont une croissance rapide. Ils prolongent leur séjour en eau douce, et certains y demeurent jusqu'à une taille assez forte, équivalant à un poids de 4 à 5 kilogrammes. Ils dépassent ensuite l'estuaire de la Gironde, se répandent d'abord sur les fonds littoraux de la côte, principalement dans les pertuis des îles de Ré et d'Oléron, et ne vont que plus tard, peu avant leur retour pour la montée reproductrice, dans les régions profondes du plateau continental.

Professeur Louis Roule. — La Migration reproductrice et la Protandrie d'*Alosa Finta* L. dans le bassin de la Seine.

Les deux espèces européennes du genre *Alosa*, *A. Alosa* L. et *A. Finta* L., peuplaient jadis le bassin de la Seine, et le remontaient au delà de Paris. A la suite de la création des barrages pendant la seconde moitié du XIX siècle, *A. Alosa* a disparu; *Alosa Finta* reste seule, encore assez abondante et confinée dans la Basse Seine pour sa migration, du Hâvre à Elbeuf.

Mes recherches, effectuées en 1920 et reprises pour contrôle en 1921, ont montré que la migration reproductrice commence vers le début de Mai; la fraie a lieu de la fin de Mai au début de Juillet, la température était comprise entre 18° C. et 22° C. Tous les individus sont en état d'élaboration sexuelle; les glandes reproductrices augmentent de volume et de poids pendant le séjour en eau douce, pour aboutir à la maturation et à la fécondation.

Les individus sont de tailles différentes; l'étude des écailles m'a permis de reconnaître que ces différences répondent à d'autres différences portant sur l'âge. Les plus petits individus sont des mâles dont les écailles marquent habituellement 2 et 3 étés, les plus gros sont des femelles dont les écailles marquent le plus souvent 4 et 5 étés. Il y a donc, chez *Alosa Finta* L. dimorphisme sexuel de dimensions, et protandrie.

Professeur Louis Roule. — La Biologie de l'Esturgeon (*Acipenser Sturio* L.) dans les bassins hydrographiques du versant Atlantique français.

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Report of the Statistical Section.

The Committee, after a preliminary meeting on Friday at 12 o'clock, met on Saturday at 3.30. There were present Prof. D'Arcy Thompson, M. Lecourbe, Mr. David T. Jones, Mr. Bottemanne, Mr. Ramalho, Sheriff Lyon Mackenzie, Dr. Russell, Mr. Nelson, Dr. Bowman and Captain Schöning.

The following resolution proposed by Mr. Nelson was unanimously adopted:

With reference to the resolutions adopted at the meeting of the Council held in 1921 with regard to the use of squared charts it was decided that certain fundamental amendments should be made in paragraphs 1) and 2). (Proc. Verb. XXVII p. 44). As amended the affected paragraphs should now read as follows:

1) That each region to be divided into squares be known and referred to by the origin of reference which will be the latitude and longitude of the bottom left-hand corner of the bottom left-hand square. The length of the sides of the bottom left-hand square, or nearly square area, shall also be mentioned in the reference, S to N in minutes of latitude and W to E in minutes of longitude. Thus the squared chart now in use by the English would be referred to as: — Ref. 51 N, 4 W, $30' \times 60'$.
2) That the region be divided by drawing parallels equally spaced North and South of the origin and separated by the number of minutes of latitude given in the reference; and in like manner by meridians to East and West. The intervals between the meridians shall be lettered to the Eastward of the origin by single letters of the alphabet, omitting I and O — A, B, C, etc. — and to the Westward by doubled letters of the alphabet reversed, omitting II and OO — ZZ, YY, XX, etc. — and in the same way, the intervals between the parallels shall be numbered Northward from the origin by arabic numerals — 1, 2, 3, etc. and Southward by numerals starting at 51 — 51, 52, 53, etc. The squares shall then be named by their co-ordinates, A4, D55, etc.

The Committee proceeded to consider the material available for the next Bulletin Statistique. Capt. Schöning reported that official statistics for 1919 were at hand from all countries except Belgium, France, Iceland and Norway; for 1920 from all except Belgium, France, Finland, Iceland, Norway and Sweden, the Swedish statistics however being promised shortly; but that for 1921 only statistics from England, Scotland and Holland were yet available. The Committee recommend to the Council that the next Bulletin should contain the statistics for 1919 and 1920 and should be published as soon as the necessary material is obtained for those years.

The Committee discussed informally the question of how in the next Bulletin the difficulties arising from fluctuations of exchange should be dealt with. The

Rapport de la Section Statistique.

Le Comité, après une réunion préliminaire, le vendredi à midi, se réunit le samedi à 3 H. 30. Etaient présents: Prof. D'Arcy Thompson, M. Lecourbe, M. David T. Jones, M. Bottemanne, M. Ramalho, Sheriff Lyon Mackenzie, M. Russell, M. Nelson, M. Bowman, et Capitaine Schöning:

Les résolutions suivantes proposées par M. Nelson ont été acceptées à l'unanimité:

Dans les résolutions adoptées à la Réunion du Conseil tenu en 1921, en ce qui concerne l'usage de cartes divisées en carrés il fut décidé que certaines modifications fondamentales devaient être faites aux paragraphes I & II (Procès-verbaux, volume XXVII, page 45). Après amendement les paragraphes en question doivent être lus comme suit:

1) Chaque région sera divisée en carrés et sera désignée par les coordonnées d'origine, qui seront la latitude et la longitude du coin en bas et à gauche. La longueur des cotés du carré placé en bas et à gauche sera aussi mentionnée dans sa référence en minutes de latitude du Sud au Nord et en minutes de longitude de l'Ouest à l'Est. Ainsi la carte divisée actuellement en usage en Angleterre, sera désignée comme suit: — Ref. 51 N, 4 W, 30′ × 60′.

2) La région sera divisée par des parallèles également espacés, du Nord au Sud, et séparés par le nombre de minutes de latitude indiqué dans la référence. De même par des méridiens de l'Est à l'Ouest. Les intervalles entre les méridiens seront désignés en allant vers l'Est de l'origine par des lettres de l'alphabet en majuscules, A, B, C, etc. . . ., en exceptant I et O; et vers l'Ouest, par des lettres doubles de l'alphabet pris en sens inverse, ZZ, YY, XX, etc. ..., en exceptant II et OO. De même, les intervalles entre les parallèles seront désignés à partir de l'origine vers le nord, par des chiffres arabes, 1, 2, 3, etc. . . ., et vers le Sud par des chiffres, à partir de 51 = 51, 52, 53 etc. . . . Les carrés seront alors désignés par leurs coordonnées, par exemple: A 4, D 55, etc. . . .

Le Comité examine le matériel du prochain bulletin statistique; le capitaine Schöning explique que les statistiques officielles pour 1919 ont été reçues de tous pays exceptés la Belgique, la France, l'Islande et la Norwège. Pour 1920, de tous les pays, excepté la Belgique, la France, la Finlande, l'Islande, la Norwège et la Suède. Toutefois les statistiques suédoises sont promises à bref délai. Pour 1921, seules les statistiques de l'Angleterre, de l'Écosse et de la Hollande ont été reçues. Le Comité proposera au Conseil que le prochain bulletin contienne les statistiques pour 1919 et 1920 et soit publié aussitôt que le matériel nécessaire sera reçu.

Le Comité discute ensuite comment, dans le prochain bulletin, seront évitées les difficultés dues aux fluctuations du change. L'opinion des Membres est que

general view of the members was that, for the main tables, the values for each country should be given in the national currency, and that, so far as possible, an abridged statement should be furnished in the introductory chapter giving the approximate values in pounds sterling after taking account of the monthly variations in rate of exchange.

Programme of the Atlantic Slope Committee.

1) Portugal. As far as the means at their disposal permit, it would be desirable for Portugal to undertake the following work:—

a) An oceanographic section from south of Cape Vincent to the coast of Morocco, as often as possible, and more particularly in January.

b) An oceanographic section from Lisbon to the Azores, and further a special monthly station from the surface to 1000 m by the Azores.

2) France. It would be of benefit that the following work were carried out by France:

a) An oceanographic section every three months along 48° 30′ N. between Ouessant and the margin of the Atlantic slope.

b) Two cruises, one in spring and the other in autumn, in order to increase the knowledge already acquired on the previous cruises in summer. The routes of these cruises, that will be conducted by naturalists, will depend on circumstances and cannot be fixed beforehand.

3) Ireland. As far as the means at disposal permit, the government of the Free State of Ireland will continue the previous researches to the south and south-west of Ireland.

4. England. (M. B. A.). It is desirable that the researches undertaken in the western part of the Channel be continued in the widest measure possible.

Programme of Work on Mackerel and Pilchard submitted to the Fish Section of the International Council for the Study of the Sea, September 1922.

By Dr. E. J. Allen.

The most important matters relating to both mackerel and pilchard which require investigation are:—

1) The completion of our knowledge of the life histories of these fishes by the discovery and capture of the younger stages, subsequent to the larval and postlarval stages. For this purpose fishing with special nets of varying mesh should be carried out on a considerable scale at all seasons of the year.

2) A study of the causes which bring about the migrations of these fishes. This will require:—

pour les tables principales les valeurs soient données en monnaies nationales pour chaque pays, et que, dans un chapitre préliminaire on fasse une évaluation approximative de ces monnaies en livres sterlings en tenant compte des variations mensuelles du cours du change.

Programme du Comité du Plateau Continental Atlantique.

1°) Portugal. Autant que le permettront les moyens dont disposera le Portugal, il serait désirable qu'il fasse comme travaux:

a) une section océanographique au sud du Cap St. Vincent, jusqu'à la côte Marocaine, aussi souvent que possible, et particulièrement en Janvier.

b) une section océanographique de Lisbonne aux Açores, et de plus une station spéciale mensuelle de la surface à 1000 m près des Açores.

2°) France. Il serait utile que les travaux suivants soient effectués par la France:

a) une section océanographique chaque trimestre le long du 48°30 N. entre Ouessant et le bord du plateau continental.

b) deux croisières, l'une au printemps et l'autre en automne pour étendre les connaissances déjà acquises par les précédentes croisières d'été. L'itinéraire de ces croisières, dirigées par des naturalistes, dépendra des circonstances et ne peut être fixé à l'avance.

3°) Irlande. Le gouvernement de l'Etat Libre d'Irlande continuera dans la mesure de ses moyens les recherches antérieures au sud et au sud ouest de l'Irlande.

4°) Angleterre (M. B. A.). Il est désirable que les recherches entreprises dans la Manche occidentale soient continuées dans la mesure la plus large possible.

Programme de Travail sur le Maquereau et la Sardine, présenté au Conseil International, Septembre 1922.

Par le Dr. E. J. Allen.

Les questions les plus importantes concernant le maquereau et la sardine, et qui demandent des recherches sont:

1) Le développement de nos connaissances sur la biologie de ces poissons par la découverte et la capture des formes jeunes, qui suivent les stades larvaires et post-larvaires; dans ce but des pêches devront être faites à toutes les saisons de l'année à l'aide de filets spéciaux à mailles différentes.

2) Une étude des causes qui entrainent les migrations de ces poissons. Ceci demandera:

a) a study of the plankton in the localities where mackerel and pilchards occur, as well as in neighbouring localities, obtained both by nets and by examining the stomachs of the fish at all sizes,
b) the collection of water samples for the determination of salinity, alkalinity and other physical and chemical characteristics,
c) an attempt to correlate the nature and abundance of the plankton with the physical conditions, and the abundance of fish with both the plankton and the physical conditions.

3) A continuation of the study of the occurrence and distribution of the eggs, larvae and young stages of the fishes, and of their food and enemies at each stage.
4) The search for mackerel and pilchards in the stomachs of other fishes obtained by ordinary trawling, longlining and other methods of fishing. This will throw light not only on the enemies of the two fishes being studied, but ought also to yield information as to the whereabouts of different growth stages which are not at present known.
5) The limits of the spawning periods and spawning areas of the fish in different localities should be determined with the greatest possible exactness, and any variations occurring from year to year in this respect should be ascertained.
6) Examination of the condition of the fish at different seasons should be made by means of chemical investigations of the different parts and organs of the body, the variations in the amount of fat and of glycogen being specially studied.

The above programme would depend chiefly upon the work of research vessels and upon laboratory researches, but work in the markets and on commercial vessels should also be carried out to ascertain the position of the shoals and their movements from season to season. The collection of scales and otoliths for age-determination and for observations on maturity together with the necessary ichthyometric work, should also be carried out on a considerable scale in connection with commercial fishing.

Programme of the Cod and Haddock Committee.

The Cod and Haddock Committee having considered and discussed the work done by the participating countries in pursuance of its Programme of 1921, reaffirms its adherence to that programme, and expresses the hope that researches on these lines will be continued without interruption over a period of years sufficiently long to yield definite results.

a) Une étude du plankton dans les localités où les maquereaux et les sardines se rencontrent et dans les environs, en cherchant ce plankton par des filets et par l'examen des estomacs des poissons de différentes tailles.
b) La récolte d'échantillons d'eau en vue de déterminer la salinité, l'alcalinité, et d'autres caractères physiques et chimiques.
c) Une étude pour établir la corrélation entre la nature et l'abondance du plankton et les conditions physiques, et d'autre part entre l'abondance du poisson et ces différents facteurs.

3) La continuation de l'étude sur la distribution des œufs, des larves, des jeunes formes de poissons, sur leur nourriture et leurs ennemis à chaque âge.
4) La recherche de maquereaux et de sardines dans les estomacs des autres poissons, obtenus par les différentes méthodes de pêche. Cette étude indiquera, non seulement les ennemis des deux poissons, mais, aussi fournira les indications sur différents stades de croissance, actuellement inconnus.

5) Les limites des périodes et des Secteurs de ponte seront déterminées dans les différents endroits avec la plus grande exactitude possible et les variations annuelles devront être précisées.
6) L'examen de l'état des poissons aux différentes saisons devra être fait, au moyen d'études chimiques, portant sur les différentes parties du corps et organes les variations des quantités de graisse et de glycogène devront être spécialement étudiées.

Le programme ci-dessus comprend essentiellement un travail de laboratoires et de navires de recherches, mais, des études sur les marchés et les navires commerciaux préciseront la position des bancs et leurs mouvements saisonniers. La récolte d'écailles et d'otolithes, pour la détermination de l'âge, et pour les observations sur la maturité, ainsi que les études ichthyométriques habituelles pourra être menée d'une façon intensive sur les navires commerciaux.

Programme du Comité de la Morue et de l'Églefin.

Le Comité de la Morue et de l'Églefin, après examen du travail fait par les différentes contrées en se conformant au programme de 1921, confirme son attachement à ce programme et exprime le désir que des recherches sur ces bases soient effectuées pendant un nombre d'années suffisant pour obtenir des résultats définitifs.

Report of the Plaice Committee.

The Plaice Committee has considered the information which has been collected concerning the plaice fisheries of the North-Sea during the year 1921. They are of opinion that this information affords definite evidence of a continued decline in the size and abundance of the plaice.

In these circumstances, while not minimising the difficulties involved in putting their proposals into execution, the Committee adhere to the recommendations which they submitted to the Council at the meeting held in July 1921.

They would add that further reports published by German experts give reason to suppose that these investigators approve the measures proposed.

H. C. Redeke J. O. Borley A. Hamman.
J. M. Bottemanne. Alexander Bowman. G. Gilson.
Kirstine Smith.

Rapport du Comité de la Plie.

Le Comité de la Plie, après examen des résultats des pêcheries de plies en mer du Nord pendant l'année 1921, pense qu'il est évident que ces poisson diminue en taille et en nombre.

Dans ces circonstances, tout en connaissant les difficultés de mettre à exécution ces propositions, le Comité confirme les résolutions soumises au Conseil en Juillet 1921 et ajoute que des rapports, publiés par des savants Allemands montrent que ces experts approuvent les mesures proposées.

H. C. Redeke. J. O. Borley. A. Hamman.
J. M. Bottemanne. Alexander Bowman. G. Gilson.
Kirstine Smith.

Programme of the Baltic Committee.

I. Detailed fishery statistics will be collected from all countries bordering on the Baltic after a uniform scheme. The statistics will comprise: 1) Quantity and value of all food-fishes caught, 2) Number, value, and size of fishing vessels, distinguishing between steamers, motor vessels, and sailing vessels, 3) Number and sort of fishing gears, 4) Number of men employed in the fisheries. It is regarded as important that the statistics should give information about the catch for each month or even for shorter periods of the year.

II. Investigations are to be made about the food-fishes in the Baltic, according to the following specified programme, which is in the first place to be applied to the middle and the northern part of the Baltic.

1) Investigations as to the spawning-areas of the cod, by statement of the occurrence of cod-eggs on or near the bottom.
2) Investigations of the problem whether the eggs are, in the various areas, developed into young.

3) Investigations as to the occurrence of larval and postlarval stages of the cod, as well as the occurrence of young-cod.
4) Investigations as to the rate of growth of the cod, as well as its age, length and weight at first maturity.
5) Investigations as to the food of the cod in the various stages of its development.
6) Investigations of the migrations of the cod, by means of marking-experiments.
7) Similar investigations are to be made regarding the flounder, especially in the northern part of the Baltic.
8) Investigations as to the Baltic herring, in certain selected places; Gotland and Stockholms Skärgård are proposed for Sweden; and for Finland; the eastern part of the Gulf of Finland. These investigations have the aim to state the racial characters, the spawning seasons, the spawning areas, the rate of growth and the year-classes, as well as the food of the Baltic herring. Special stress is laid upon the investigation of the Baltic Herring, and its relation to the deficit of oxygen in the deep-water.
9) Similar investigations are to be made on the foodfishes of the southern Baltic.

III. Simultaneously with the investigations mentioned in II, investigations are to be made on the plankton and on the hydrographical conditions.

IV. The cruises in the northern part of the Baltic will be continued, and hydrographical observations in the southern part of the Baltic will also be made.

V. Observations from lightships and from adequate points of the coast will be made in the Baltic on temperature, salinity and currents in the surface and at different depths with a degree of frequency sufficiently high to follow the hydrographical variations in the Baltic.

VI. The possibility of making serial observations of oxygen (temperature and salinity) down to greater depths at selected points (e. g. off Christiansö, Visby, and Märket), is to be discussed between the hydrographers of the countries interested.

VII. Continuous observations of sea-temperatures by means of thermographs to be made the subject of preparatory experiments.

VIII. Monthly mean values of the hydrographical observations taken from lightships in the Baltic shall be published in the Bulletin Hydrographique.

REPORT

of

ADMINISTRATION 1921—1922.

I. General.

Composition of the International Council for the Exploration of the Sea.

During the year 22nd July 1921—21st July 1922 the following changes occurred in the composition of the International Council:

Monsieur NAUD, delegate for France, has been replaced by Monsieur LECOURBE, Directeur du service des Pêches maritimes et du Personnel central au Sous-Secrétariat d'État de la Marine Marchande.

Portugal having adhered to the Council has appointed as delegates: Vice Admiral AUGUSTO EDUARDO NEUPARTH and Colonel FRANCISCO AFONSO CHAVES.

Composition of the Bureau.

In the beginning of the year July 1921—July 1922 the Members of the Bureau were: Mr. H. G. MAURICE, President, Professor OTTO PETTERSSON, Dr. JOHAN HJORT, M. THÉODORE TISSIER and the General Secretary Captain C. F. DRECHSEL.

Committees.

Besides the ordinary Committees (viz. the Finance, the Statistical and the Editorial Committee), the Plaice Committee, the Herring Committee and the Atlantic Slope Committee have worked during the year.

Audit of Accounts.

The Accounts of the Council for 1920—21 — of which a Statement is given below — have been revised and found correct by the Finance Committee, and are now submitted to the Council for its approval.

A Statement is also given below of the Accounts for 1921—22, just closed.

Statement of Accounts for the financial year 1920—21.

Receipts:

			Estimates	Real Receipts
I.	1.	Balance brought forward from 1919/20..	50 000.00	63 484.96[1])
II.	2—9.	Annual contributions of the governments for 1920/21.....	72 500.00	73 701.87
III.	10.	Interest.....	0.00	1 817.31
IV.	11.	Sale of publications.....	0.00	38.43
		Total Kr....	122 500.00	139 042.57[1])

Expenditures:

			Estimates	Real Expenditures
I.	1—6.	Incidental Expenses.....	20 600.00	20 600.00
II.	7—11.	Assistance.....	20 550.00	19 750.00
III.	12.	Expenses of the Office in Copenhagen....	10 000.00	8 870.55
IV.	13.	Travelling Expenses	4 000.00	6 031.13
V.	14.	Printing	17 000.00	1 970.70
VI.	15.	Unforeseen Expenses.....	50 350.00	0.00
		Total Kr....	122 500.00	57 222.38

Receipts	for the financial year 1920—21.....	Kr. 139 042.57[1])
Expenditures	— — — —	- 57 222.38
Cash balance	to carry forward to 1921—22	**Kr. 81 820.19**[1])

[1]) + Russia's contribution for 1914/15, **Rbl. 14 430.54,** deposited in a Petrograd bank.

Statement of Accounts for the financial year 1921—22.

Receipts:

			Estimates	Real Receipts
I.	1.	Balance brought forward from 1920/21 ...	81 820.19	81 820.19[1])
II	2—9.	Annual Contributions of the Governments for 1921/22	105 000.00	105 098.61
III.	10.	Interest	0.00	1 914.27
IV.	11.	Sale of publications	0.00	602.47
		Total Kr....	186 820.19	189 435.54[1])

Expenditures:

			Estimates	Real Expenditures
I.	1—6.	Incidental Expenses	25 600.00	25 600.00
II.	7—11.	Assistance	28 250.00	26 750.00
III.	12.	Expenses of the Office in Copenhagen ...	12 600.00	7 959.12
IV.	13.	Travelling Expenses	7 000.00	6 375.87
V.	14.	Special Resolutions of the Council	12 000.00	3 000.00
VI.	15.	Printing	50 000.00	14 996.56
VII.	16.	Some special proposals	11 000.00	11 000.00
		Total Kr....	146 450.00	95 681.55

Receipts	for the financial year 1921—22	Kr. 189 435.54[1])
Expenditures	— — — —	- 95 681.55
Cash balance	to carry forward to 1922—23	**Kr. 93 753.99**[1])

[1]) + Russia's contribution for 1914/15 **Rbl. 14 430.54** deposited in a Petrograd bank.

Copies of these two Statements have been distributed together with the Agenda for the Council meeting.

Meetings.

Meeting of the Bureau has been held in Copenhagen before and during the Council Meeting in July and in London 17th March 1922. Present were: Mr. MAURICE, President, Professor O. PETTERSSON, Professor HJORT, Professor JOUBIN with Dr. LE DANOIS and Captain DRECHSEL.

II. Work of the Bureau at Copenhagen.

An elaborate ordinary work (correspondence, administration etc.) has been carried out at the Bureau during the past financial year.

A. Publications.

Report regarding the Publications issued and cost of same during the financial years 1920—21 & 1921—22.

1920—1921.

V. — **14. Printing.**

		Estimate	Expenses
Publ. de Circonstance Nr. 74, by Dr. le Danois, 600 copies	Kr.	. . .	934.80
»Liste des Publications«, 1000 copies	-	. . .	207.80
Distribution of Publications	-	. . .	828.10
	Kr.	17 000.00	1 970.70
Balance	-		15 029.30
	Kr.	17 000.00	17 000.00

1921—1922.

VI. — **15. Printing.**

		Estimate	Expenses
Rapp. & Procès-Verbaux Vol. XXVII (July 1921), 600 copies	Kr.	4 000.00	3 083.08
Hydrographical Bulletin, La Mer du Nord (for 1905—1914), 550 copies	-	6 000.00	2 442.60
Statistical Bulletin Vol. X (for 1914—1918), 800 copies	-	6 000.00	7 002.35
Plankton Bulletin	-	6 000.00	0.00
Occasional Papers:			
Publ. de Circonstance Nr. 75, by Dr. J. Gehrke, 600 copies	-	6 000.00	1 173.28
3 special reports	-	10 000.00	0.00
Distribution of Publications	-	3 000.00	1 295.25
Unforeseen printing	-	9 000.00	0.00
	Kr.	50 000.00	14 996.56
Balance	-		35 003.44
	Kr.	50 000.00	50 000.00

B. Other work of the Bureau.

Report of Work Carried out by the Departments of the Bureau during 1921—22.

a. Hydrographical Department.

1. The Department took care of the final redaction and the printing of the "Bulletin Hydrographique", mer du nord, 1905—1914.
2. Dr. Gehrke continued and finished his working up of the material to his "Publication de circonstance" about the ice-winters. The printing of this paper is now going on.
3. Professor Knudsen has worked out a treatise "On measurements of the penetration of light into the sea" and another treatise "Some new oceanographical instruments." These are proposed to be published as "Publications de circonstance."
4. The department has acted as an adviser on scientific and technical problems raised by oceanographers in various countries.
5. The department has corresponded with the different participating hydrographers about the hydrographical material for the next issue of the "Bulletin" in accordance with the regulations laid down in the programme of the Council.

b. Statistical Department.

During the year 1921—22 the "Bulletin Statistique" for the years 1914—18 (the war years) is printed and was distributed the 1st of August 1922 to the various countries. The work with the next "Bulletin Statistique" for the years 1919—21 is commenced and finished with respect to some of the countries.

The library, belonging to the Bureau, has been catalogued and is now kept up to date.

c. Plankton Department.

The editor for the Plankton questions has during the financial year assisted the General Secretary in matters concerning plankton.

No plankton reports have been sent to the Bureau for printing.

The exact specification of the standard net recommended by the Plankton Section at the meeting of July 1921 (Proc. Verb. XXVII, p. 36) has not yet been forwarded to the Bureau and consequently no circular has been sent out.

III. Work of the Participating Countries in accordance with the Programme of the Council.

A. General observations.

Belgium. Owing to lack of a research ship and of a laboratory and having had at disposal very few naturalists only Belgium has not been in a position to

carry out much work during the past year. The Belgian delegate, Professor Gilson, reports as follows:

Des pêches expérimentales ont été faites dans la zone littorale de 10 milles à l'aide du cutter O. 13 et du bateau O. 5.

Ces navires ont pêché chaque semaine, au même moment, l'un dans la zone de 3 milles, l'autre plus au large.

La masse rapportée par leur filets a été complètement analysée; les poissons ont été comptés et mesurés et les invertébrés identifiés et comptés ou évalués quantitativement.

De plus un certain nombre de pêches ont été faites dans la même zone par le petit steamer "Talisman" qui est ma propriété personnelle en vue d'évaluer les variations de la quantité du produit par heure de pêche.

L'analyse des matériaux considérables recueillis précédemment pour l'étude de la variation de la nourriture des poissons à des âges divers a également été poursuivie.

De grands efforts sont faits pour obtenir du Gouvernement un navire et un laboratoire et le steamer "Oithona" cédé par le laboratoire de Plymouth vient d'être acquis. On espère donc pouvoir reprendre les explorations sur la côte belge et aussi obtenir du Gouvernement pour l'année prochaine la création de laboratoire reclamé par le Musée royal d'Histoire naturelle et indispensable pour les recherches concernant les pêcheries.

Denmark. During ten months of the passed financial year the Danish research steamer the "Dana" has carried out Atlantic investigations. North Sea and Baltic investigations have been made by motor boats and by observations on fish landed by commercial fishing vessels.

Finland. Investigations are carried out in the northern Baltic, the Bothnic and the Gulf of Finland on the steamer "Nautilus" and motorboat "Aurelia" at different occasions. Further special investigations have been made at different coastal points, harbours, lakes and rivers. A continuous service at coastal points and lightships gives the main basis for the thalassological studies. Publications are issued by G. Granqvist, E. Häyrén, R. Jurwa, H. Renqvist, I. Wälikangas and R. Witting.

France. En 1921, la France a organisé les croisières suivantes:

1°) Juillet—Septembre: Croissières du chalutier "Tanche" dans le Golfe de Gascogne et à l'entrée de la Manche, entre l'Espagne et l'Irlande.

2°) Août—Septembre: Croisières du navire "Pourquoi Pas?" à Rockall et dans la Manche Occidentale.

3°) Août: Croisière du garde pêche "Petrel" sur la côte sud de Bretagne.

4°) Croisières périodiques mensuelles des canonnières de la Marine Nationale "Conquérante" et "Engageante" au large d'Ouessant.

En 1922, le même programme a été suivi en ce qui concerne les croisières de la "Tanche" et du "Pourquoi Pas?" ainsi que les tournées périodiques des canonnières. Ce programme est actuellement encore en cours d'exécution. De plus une mission spéciale de recherches océanographiques a été accomplie sur le Barre de Vue Neuve par le croiseur "Carriopée" ayant à son bord le Dr. LE DANOIS.

Le résultat des croisières de 1921 fera l'objet d'une partie du rapport du Comité du Plateau Continental Atlantique.

Great Britain. England. The research vessel "George Bligh" was laid up in the interests of public economy during December and January. During the period covered by the present British report 21 cruises were made in the North Sea and the eastern part of the English Channel.

Scotland. From July 1921 to February 1922 the research vessel "Goldseeker" carried out a series of eight cruises lasting about three weeks each, In February this vessel was dismantled in preparation for the fitting out and commissioning of the new research vessel the "Explorer." Owing to the industrial position great delay was experienced in getting the ship ready for sea and her first cruise was not started until July 1922.

In the first cruise of the "Goldseeker" trawling experiments were made in the Moray Firth and off the Aberdeenshire coast. In August, however, in view of the failure of the Scottish drift-net summer herring fishing, the area between Aberdeen and Shetland was surveyed to ascertain the prevailing hydrographic and planktonic conditions. A second survey of this area was completed in September as well as a further trawling survey of the Aberdeenshire grounds. The third series of trawling experiments was carried out off the Lincolnshire coast with a view to transplanting Black Soles from that area to the Scottish coast. Whilst the season was perhaps somewhat late for such experiments, the exceptionally rough weather experienced both during the trawling operations and on the passage north interfered greatly with the proper conduct of the experiments and only thirty-nine soles were brought alive to the Firth of Forth and liberated there. During the latter part of November, in December and in February, the Moray Firth and Aberdeenshire grounds were again surveyed.

In the period under review, the observations made with the commercial otter trawl were distributed as follows:

Area	No. of Experiments	No. of Hours Trawling	No. of Fish Caught
Moray Firth	71	136½	153,815
Aberdeenshire coast	28	54½	107,834
Lincolnshire coast	16	29½	3,382
Middle North Sea	2	4	758
Firth of Forth	1	2	420
Total	118	226½	266,209

In sixty of these experiments, a covering of small mesh was used over the ordinary cod-end. As usual, records of size, sex, degree of maturity etc. of all species were kept, but special attention was devoted to haddocks, plaice, cod and lemon soles.

From the latter half of December until the end of March the motor boat "Enid" carried out a research into the younger stages of the herring in the Inverness and Beauly Firths. From April until July the "Enid" was used in making an extensive investigation into the bottom fauna of the inshore grounds from Red Head to the Dornoch Firth by means of the Petersen Grab.

Intensive investigations on the haddock, a species of considerable importance to Scotland, have been carried out on the lines of the International programme.

The following are the numbers of haddocks examined from the various areas investigated by the research steamer during the period:—

Moray Firth	48,658
Aberdeenshire Coast	52,854
Middle Grounds	138
Firth of Forth	93
Total	101,743

Hydrography. Only work in connection with the definite fishery investigations has been attempted. Special attention has been paid to the hydrographic conditions in the North Sea consequent upon the admixture of Atlantic water. The research vessel immediately she was ready for sea (July) left to explore this area.

Holland. Owing to the lack of a research vessel the biological work of Holland was chiefly directed to investigations in the inshore and coastal waters. For the same reason hydrographical work was confined to the ordinary surface observations on board steamers and lightvessels and some station work at Helder. On the lightvessels meteorological observations were made as usual.

Sweden. Publications by O. Pettersson, J. W. Sandström, J. Sjöstrand, G. Ljungdahl have been issued.

B. Investigations.

a. Hydrographical Programme.

I. It is recommended that Great Britain shall undertake temperature- and salinity-determinations once every day on at least two light-vessels in the North Sea. The determinations of temperature and salinity on the Dutch lightships are to be carried out according to the scheme hitherto followed. It is highly desirable that the observations from the Danish lightships in the North Sea and from Skagen southwards be carried on as hitherto. Sweden undertakes similar observations on the same scheme from 3 Swedish lightships in the Cattegat.

Belgium. Les observations océanographiques et météorologiques, pour des motifs divers, n'ont pu être reprises que récemment à bord du bateau-phare du "West-Hinder."—

Une nouvelle série d'expériences sur le cheminement des objets flottants à la surface ou sous celle-ci a été entreprise.—

Ses résultats s'ajouteront à ceux qui ont été obtenus avant la guerre. La publication de ces résultats, avec des cartes mensuelles a été poussée activement et ne tardera plus à être achevée.

Denmark. Since the beginning of 1922 current-measurements have been made every 4th hour at each 5 metres from the surface to the bottom at the light-ship "Horns Rev".

England. Arrangements were successfully completed for observations on salinity, temperature and weather conditions to be taken daily at 8 a. m. as from 1st January 1922 at Smith's Knoll and Varne Light Vessels, and the work is being carried on regularly. In the Channel the Seven Stones Light vessel continues to make 8 surface observations each month.

Sweden. Surface-observations concerning the salinity and temperature of the North Sea and the Atlantic have been executed in every month on board the Swedish liners on their voyages from Gothenburg to New York. (See also Baltic Committee).

II. It is recommended that current-measurements shall be carried out in the North Sea on 2 or 3 English lightvessels and on 1 Dutch lightship. These measurements are to be made at least 3 times every day at least at 3 depths, namely near the surface, near the bottom and at an intermediate depth, and once a day series of these measurements are to be made at smaller depth-intervals.

England. A Jakobsen Meter has been installed on the Varne and Smith's Knoll Light Vessels and full instruction given to the crew in its working. Observations were commenced on 1st January 1922 and are made three times daily at 8 a. m., 2 p. m. and 9 p. m. at intervals of 5 metres.

III. It is recommended that Sweden shall undertake current-measurements according to the same scheme at the "Fladen" in Cattegat.

Sweden. See Baltic Committee.

IV. It is recommended that monthly mean values of the hydrographical measurements from all lightships in the North Sea, Cattegat and the Baltic shall be published by the Bureau in the Bulletin Hydrographique.

Denmark. Arrangements have been made for timely transmissions to the Bureau of all data called for.

England. A routine has been instituted which provides for the timely transmission to the Bureau of all data called for, and arrangements have been made with the Ministry's statistical officers to ensure that it shall be presented in the form desired.

V. It is recommended that the Bulletin Hydrographique should contain monthly mean values of the sea level from existing observations.

England. The Bureau has been put in communication with the Ordnance Survey with a view to obtaining monthly mean values of the sea level at three English stations.

Other hydrographical work:

England. The arrangements for collecting surface samples on steamship routes have been revised and certain modifications introduced in order to keep the number of samples within workable limits. The following routes are now in operation:

North Sea — Tyne to Christiania (as far as the great Fisher Bank).
English Channel — Newhaven to Dieppe.
Southampton to Havre.
Southampton to St. Malo.
Liverpool to Charente (across the mouth of the Channel).

With the co-operation of the Air Ministry surface samples and temperatures are taken along two Atlantic routes, and under the supervision of Professor JOHNSTONE along three routes across the Irish Sea. Copies of data are sent to the Bureau, to the Atlantic Slope Committee and to others concerned.

The routine observations on the Research Ship have, however, been dropped, as they were found to be too scattered to serve any useful purpose.

In order to throw light upon the unusual scarcity of herrings, a cruise was carried out between October 4th and 10th along lines from the Norfolk coast to west of the Dogger, then north of the Dogger to the Great Fisher Bank. Intensive hydrographical observations were made at 22 stations and oxygen samples were collected from the deeper water layers. Collections of plankton were also made. The results have been worked up in connection with other hydrographical data obtained from the Light Vessels, with a view to comparison with the conditions in former years.

A special cruise from Tyne to Naze of Norway was carried out in May. This cruise will, it is hoped, be the first of a series of annual cruises devoted to general hydrography in the northern part of the region. The stations are so placed as to form a basis for hydrodynamical determination of currents, as well as to sample the salinity of the area on an adequate scale.

Ireland. In accordance with the proposals agreed to by the Hydrographic

Section, all hydrographic work has been done as a part of the programme of the Atlantic Slope Committee.

Denmark. 1) The collecting of water-samples and measuring of temperatures has been continued on the routes:

København—New York.
Esbjerg—Harwich.
København—Island.
København—Grønland.

2) Continued hydrographical observations in the Ringkøbing Fjord in connection with the biological investigations carried out in this area.

3) Hydrographical investigations have been carried out in March 1922 from the fishery-inspection steamer "Falken" in the Great Belt and the Beltsea.

4) Determination of the contents of lime in various Danish lakes and streams.

5) Continuation of the working up of the current-measurements from light-ships and of hydrographical observations from a cruise with a power-boat in the Sound in 1914.

6) Collaboration with the Biological Department as to the influence of the temperature upon the yield of the eel-fishery.

7) Hydrographical researches on the "Dana"-expedition, September 1921—July 1922.

Finland. 1920. March. Res. 2. The surface observations of salinity and temperature on the line Helsingfors—Hull have been continued.

1920. March. Res. 12. Daily observations of ice and weekly charts of icecover are made at 98 stations on the coast of Finland.

1920. March. Res. 14. Preliminary studies of the evaporation are made in July 1922.

1920. March. Res. 15. Six new tidalgauges (Kemi, Toppila, Brahestad, Jakobstad, Wasa, Åbo) are working, three are in construction.

(See also Baltic Committee).

France. Recherches quotidiennes depuis 1920 au bateau-phare de Sandettie (Mer du Nord).

b. Plankton Programme.

The following resolutions were passed at a meeting of the Plankton Section held at Copenhagen on July 15th, 1921 at 3 p. m.:—

1) That this Section recommends the adoption of the following standard methods for vertical plankton hauls to replace the use of NANSEN and APSTEIN nets as formally recommended by the Council.
2) That this Section desires that each country should make experiments with a

view to sending definite recommendations for the adoption of a standard horizontal plankton net to the next meeting of the Council.

3) That attention should be drawn to the use of neutralised Formalin (3 to 4 cc of neutralised 40 % Formaldehyde to a 250 cc sample) for the preservation of calcareous organisms in quantitative plankton samples.

Denmark. 2) A new horizontal closing plankton net was constructed and tried on the "Dana"-Expedition, but the results were not satisfying.

3) The use of neutralised formaline has been continued for preserving nanoplankton samples, and the results are satisfying as regards the calcareous organisms.

Scotland. 1) A net as defined in the section has been made and will be exhibited at the next meeting of the Council.

2) A method of working a horizontal closing net will be brought forward at the next meeting.

3) The use of neutralised formaline for the preservation of plankton samples has been adopted and it is found that the calcareous organisms are well preserved.

Ireland. The plankton collected on the South coast of Ireland has, in general, been dealt with as recommended by the Plankton Section, but the type of vertical net recommended by the Section has not yet been taken into use.

6) That in order to make it possible to work out a greater number of quantitative plankton samples it is recommended that some selection of the organisms to be counted should be made. It is not considered desirable to fix any exact limits since the only sure guide to a suitable selection will be the experience of the worker.

England. 6) This principle has been adopted where it is desired to work rapidly through a collection.

7) That each country or worker should endeavour to form a type collection or keep typical samples of all organisms identified which could then be available for future reference. Exchange of specimens and correspondence between the workers would tend towards uniform nomenclature.

Denmark. 7) A type collection of plankton diatoms, several other micro-plankton organisms and several macro-plankton organisms has been formed, and some examples of specimens have been sent to other workers.

England. 7) A type collection is in process of formation and at present includes over 100 forms.

8) That samples for the quantitative determination of the micro-plankton should be collected in conjunction with hauls for the collection of eggs and larvæ of fish from selected stations.

England. 8) In the course of the cruises carried out for the study of larval

and post-larval herrings 34 samples of micro-plankton have been preserved and examined quantitatively.

Scotland. 8) Samples have been collected during all cruises and are being worked up quantitatively.

Other plankton work:

Denmark. On the "Dana"-Expedition a large material of plankton has been collected, viz:

a) A series of water samples preserved with neutralised formaline, to be used for the study of the nanoplankton by means of centrifuge and microscopical examination and counting.

b) A large series of micro-plankton, both horizontal hauls and vertical hauls by closing-nets (NANSEN's pattern) were made. Most of the samples were examined in living stage on board the steamer while working in the Caribbean Sea and adjacent areas, and also in the Pacific (Gulf of Panama).

c) Macro-plankton was collected in connection with other biological works.

England. No work has yet been carried out in standardising methods and gear. The plankton collected during the plaice-egg cruises in the winter 1920—21 has been studied in detail and a report is in process of completion. Regular collections of macro-plankton have been made in connection with hydrographical work and the capture of larval herring: 113 samples have been examined quantitatively and 124 qualitatively. A study has been commenced of the extent to which shoaling of plankton occurs.

Investigations into the plankton brought into the North Sea by the abnormal influx of Atlantic water during 1921 have been carried out, with the result that great quantities of the Atlantic pteropod *Limacina lesueuri* (d'Orbigny) were recorded for the first time in the North Sea.

Also a few specimens of young *Peraclis* appeared for the first time on record. *Limacina retroversa*, not usually abundant off our east coast, appeared in great numbers. The Radiolarian — *Acanthometron quadrifolia*, a common Gulf stream form, usually rare in the North Sea, occurred in enormous numbers. The medusa, *Tima bairdii*, common off the Scotch coast, appeared to be unusually common as far south as the Wash.

During the hydrographical cruise from the Tyne to the Naze of Norway in May 1922 similar investigations were carried out, but only a few *Limacina lesueuri* were recorded.

Finland. The special investigations of the littoral vegetation in the harbours and environments of Helsingfors is completed and published. Similar researches in Hangö and Ekenäs continued. The detailed investigation of the plankton in the harbours and waters of Helsingfors is continued, and a study of the fluctuations of

the plankton and the corresponding chemical properties of the water is also going on.

In connection with the work in May and July 1922 were taken samples for determination of plankton.

France. Recherches quotidiennes depuis 1920 au bateau-phare de Sandettie (Mer du Nord). Triage et déterminations au Laboratoire de Boulogne-sur-Mer.

Holland. A series of nanoplankton samples from the southern North Sea collected and preserved after GRAN's method in March and April 1914 was partly worked up. No new plankton material was collected during the last year.

c. Statistics.

Belgium. Le travail de la statistique du marché au poisson d'Ostende ainsi qu'il est dit plus haut a été interrompu par des difficultés survenues au sein du personnel de la minque. Cependant les quantités de poissons débarqués au cours de l'année sont annotées et pourront être tabulées, si l'utilité de ce travail tardif se fait encore sentir. De plus la nomination toute récente d'un excellent directeur de ce marché nous garantit pour l'avenir le fonctionnement d'un service statistique de premier ordre.

Denmark. The general statistics of catch are collected and published yearly for each of the principal waters round Denmark: The North Sea, Skagerak, Kattegat, Belt Sea, Sound, Western Baltic and True Baltic. Besides this a great material is collected upon which more detailed statistics can be worked out, e. g. catch per month, catch per fishing day, catch in each of the depth areas or rectangular areas etc.

England. The system of rectangular areas on the plan recommended by the Statistical Committee had already been put into operation for demersal fish in the North Sea at the beginning of 1920, but the areas used are based on Mercator's projection. The method of nomenclature recommended by the Committee has been adopted and extended to regions outside the North Sea. As from Jan. 1st, 1922, pelagic fish are being tabulated both in the North Sea and outside in the new rectangular areas. An attempt is being made to extend the system outside the North Sea for demersal fish also.

Scotland. At a meeting of the Interdepartmental Conference held in London on October 6th, 1921, it was decided to adopt, provisionally, certain fundamental amendments to the proposals brought forward and carried at the last meeting of the International Council at Copenhagen in July 1921.

As now amended, the affected paragraphs in the original report (Proc. Verb. XXVII, p. 44) read as follows:—

A 1) That each region to be divided into squares is known and referred to by the origin of reference which will be the latitude and longitude of the bottom

left-hand corner of the bottom left-hand square. The length of the sides of the bottom left-hand square, or nearly square area, shall also be mentioned in the reference, S to N in minutes of latitude and W to E in minutes of longitude. Thus the squared chart now in use by the English would be referred to as:— Ref. 51° N, 4° W, 30′×60′.

2. That the region shall be divided by drawing parallels equally spaced North and South of the origin and separated by the number of minutes of latitude given in the reference; and in like manner by meridians to East and West. The intervals between the meridians shall be lettered to the Eastward of the origin by single letters of the alphabet, omitting I and O — A, B, C, etc. — and to the Westward by doubled letters of the alphabet reversed, omitting II and OO — ZZ, YY, XX, etc. — and in the same way, the intervals between the parallels shall be numbered Northward from the origin by arabic numerals — 1, 2, 3, etc. and Southward by numerals starting at 51 — 51, 52, 53, etc. The squares shall then be named by their co-ordinates, A 4, D 55, etc.

Holland. Collections of statistical data about the commercial trawling as far as possible. The tables contain:

1. Total number of days of absence of all kind of Dutch trawling craft in the North Sea for 1913, 1919, 1920, 1921.
2. Total quantity in K. G. of plaice, landed in Dutch ports, by the trawling craft from the North Sea (1909—1913, 1919, 1920, 1921).
3. Catch per day's absence of roundfish and plaice in K. G. by the trawlingvessels of different kind (1909—1913, 1919, 1920, 1921).
4. Calculated number of days of absence of Ymuiden steamtrawlers in the various fishing areas (1919, 1920, first half of 1921).
5. Perc. of the days of absence of Ymuiden steamtrawlers, monthly calculated for the various areas (1920, first half of 1921).
6. Absolute weight, and perc. of the whole catch, of the trade categories of plaice by all Dutch trawling vessels (1909—1913, 1919, 1920, 1921) annually and monthly.
7. Number of plaice monthly measured at sea out of unsorted catches from September 1920 to August 1921.
8. Measurements of plaice at sea from the various regions: analysis of 1000 specimens.
9. Measurements of plaice at sea from various squares, monthly arranged.
10. Charts showing central values of length for the whole year in the regions, together with similar German results.
11. Chart showing central values throughout the year in some squares along Dutch and German coast.
12. Perc. of plaice below 25 cm. in the regions, monthly, from September 1920 to August 1921.

13. Idem according to German measurements 1919, 1920.
14. Chart showing number of plaice measured and central value in some squares in German Bight, each square divided in 9 parts.

Extensive tables of the loss to Dutch steam-trawlers by closing B3 to 12 fathoms and B4 to 15 fathoms depth, both for the whole year, and for the eventual opening of these grounds in second quarter of the year, are still to be prepared.

d. Herring.

The programmes of work for the various countries concerned are as follows:

Researches under paragraphs in the programme:

Denmark:	1, 5, 6 and 7.
Finland:	2, 5, 6 and 7.
France:	1, 6 and researches on the southern limit of distribution.
England:	1, 3, 4, 7, 8, 9 and 11, especially 1, 4, 7 and 11.
Holland:	6.
Ireland:	1, 2, 9.
Norway:	1—11 except 10, especially 2, 4, 5 and 7.
Scotland:	1—12.
Sweden:	2, 4, 5, 6, 7, 8 and 11.

1. Yearly and monthly statistics of the herrings landed from each fishery according to weight, value, methods of fishing and place of capture. As far as possible statistics of the disposal of the herring.

Denmark. 1) Monthly statistics are collected in part, yearly statistics in full.

England. 1) A study of the commercial statistics in the years immediately preceding the War is included in a report on Herring Trawling now published.[1])

Scotland. 1) These statistics are kept in full for all ports by the Fishery Officers on the Board.

Ireland. 1) Statistics in accordance with paragraph 1 of the programme have been sent to the reporter of the Committee.

Norway. The Norwegian programme for herring investigations comprised p. 1—11 except p. 10 in the programme of the international herring committee, especial weight being laid upon p. 2, 4, 5 and 7.

Owing to the illness of the scientist in charge of the herring researches these had to be carried out in a less extensive scale, according to p. 2, 3 and 5 in the international programme. In connection with these herring investigations Professor Dr. H. H. Gran made some quantitative investigations about the rise of

[1]) J. O. Borley and E. S. Russell. — Report on Herring Trawling. Fishery Investigations, Series II, Vol. IV, No. 4, 1922.

the spring plankton in the spring herring-districts, in its ultimate consequences bearing upon point 8 in the programme.

The material collected consists of a series of samples of immature herring from the northern Norway and a series of samples of mature and spawning herring caught at the west coast of Norway during the spring of 1922.

Both series of samples are supposed to give a fairly representative picture of the shoals from which they are collected, and the material will permit of investigating the age composition of the shoals, the length, sex and growth of the individuals (in some samples also the weight, state of sexual organs and fat contents).

The material has been partly worked up.

2. Investigations of representative unsorted samples with regard to which the place and time of capture are known, especially of spawning shoals as to size, weight, sex, maturity and age. The age should be determined by a study of the scales.

England. 2) Several samples of drifter catches have been investigated in respect of size, weight, maturity and age.

Scotland. 2) During the summer herring fishing fortnightly unsorted samples of about 500 fish each are fully examined from each of the areas within which drift-net fishing is prosecuted. These samples are obtained from the following ports —Lerwick, Stronsay, Wick, Macduff, Fraserburgh, Peterhead, Aberdeen, Eyemouth and Stornoway. Arrangements have been made for the examination of about sixty samples during the Scottish herring fishing season.

Ireland. 2) Investigations of representative samples in accordance with paragraph 2 have been made on behalf of the Irish Department by Mr. B. Storrow of the Dove Marine Laboratory, Cullercoats, and its results have been sent to the reporter of the Committee.

Finland. 2) Collections of material from various parts of the Finnish Bay.

3. Comparative investigations of the composition of catches made with different gear.

Scotland. 3) Catches made by the trawl are examined as in 2.

4. Investigation of the younger stages of herring, especially in regard to their distribution.

England. 4) An extensive material of larval and post-larval stages, amounting to over 12,000 specimens has been collected throughout the year in the Southern North Sea, the eastern part of the English Channel and in the Wash, which, in conjunction with the material obtained in previous years from the whitebait fishery, has already yielded valuable results.

Scotland. 4) Special efforts have been made by the use of smallmeshed nets to capture representatives of the younger year classes. Records are also kept of the occurrence of herrings in the stomachs of other fishes. In this connection,

an investigation into the younger stages of the herring during the winter in the waters about the Inverness Firth was carried out in the motor boat "Enid". Operations actually commenced in December 1921 when the sprat and herring fisheries were already in progress. Different methods of fishing were adopted: drift and anchored nets, with considerable range in the size of meshes, were first employed. By this means herring identical with those landed by local fishermen were captured, and in addition, large adult herring ranging in size from 24 to 30 cm. A very small mesh seine net gave the best results insomuch as its action was less selective and thereby better evidence was forthcoming as to the relative numbers of each group or brood present in the Firths. Fishing was also carried on by means of a bag-net, made of Hessian cloth, which was allowed to stream from the boat at anchor in the tideway. This method yielded yet another brood of small unscaled herrings.

The net result of the investigations so far shows that at least five distinct groups of herrings were present within the Firths:—

		Approxim. Av. Size.
Group	I: unscaled	4 cm
—	II: scaled	9 -
	III: —	13 -
—	IV: —	19 -
—	V: —	26 -

Overlapping in the intermediate sizes was almost negligible.

Practically all individuals in Group IV were immature fish. A few were found with well-developed reproductive organs. This fact coupled with discrepancies in age-determination according to the scale readings would seem to indicate that this group is not so homogeneous as it looks, but that it is a mixture of Group II and III at a later stage (1 year).

5. Investigation of the rate of growth at all stages, especially by study of the scales.

Denmark. 5) Investigations as to the rate of growth of herring have been carried out.

Finland. 5) Collections of material from the various parts of the Finnish Bay.

England. 5) A critical examination of the determination of age by scale rings has been commenced, and has yielded provisional conclusions which seem to point to a need for a modification of the usual interpretation of the rings. The rate of growth of the younger stages has been determined by measurements of samples taken at different times of the year.

Scotland. 5) These methods are under consideration.

6. Determination of the race differences by means of a study of morphological characters according to a uniform method.

Denmark. 6) The study of the race differences in herrings from the North Sea and the waters between the North Sea and the Baltic has been continued.

Finland. 6) Collections of material from the various parts of the Finnish Bay.

England. 6) A detailed examination of the data obtained in 1914 has been left in abeyance. In view of the work on age determination, referred to above, it was felt that interpretation of scale rings should be set on a sounder basis, before the very small differences found in the race data can be regarded as definitely racial in character, such differences being possibly correlated with differences of age.

Scotland. 6) Samples from the more important localities where herring fishing is prosecuted have been examined for race differences.

7. Location of the spawning places, especially by the occurrence of the eggs or newly hatched larvae. Investigation as to the nature of the bottom at the spawning places. Samples of the herring spawning on the places are to be examined with regard to racial characters, age, composition and growth.

Denmark. 7) The pre-war material has partly been worked up.

Finland. 7) The spawning grounds at the Northern coast of the Finnish Bay are marked out on sea-charts.

England. 7) An intensive search for herring spawn was carried out in August and September near the Longstone and on the Dogger with negative results although records of "spawny" haddocks indicated that spawning took place in these areas.

Forty positions at or near which herring spawned during last year and certain previous years, as inferred from the capture at these places by trawlers of haddock and cod, the stomachs of which contained herring spawn, have been charted. Most of these positions lie between 56° and 53° latitude and west of 3° E. longitude. They mostly coincide with or are in near neighbourhood of places at which the bottom deposit contains an appreciably large proportion of stones and shells; the chart prepared for a forthcoming report on the Bottom Deposits of the North Sea providing the basis for comparison. The provisional inference is that the presence of stones etc., influences the selection of spawning sites, but more data are required to make the correlation definite.

The character of the bottom was ascertained by the use of the PETERSEN grab and conical dredge.

Scotland. 7) During September, special efforts were made to capture the newly hatched clupeoids and so locate the spawning grounds. Information was also collected regarding the capture of "spawny" haddocks. Previous records of clupeoids are also being systematically worked up with a view to the delimitation of the spawning areas and the dispersal of the post-larval stages.

8. Investigation of the food of larval and post-larval herrings.

9. Investigation of the food and the condition of the older herrings of different localities and in different seasons.

England. 8—9) This work is just commencing, but so far over a thousand stomachs of larval and post-larval whitebait and mature herring have been examined from 40 different samples. Where possible plankton samples are being taken at the same time. Arrangements have been made for the stomachs of mature herring from freshly caught specimens to be preserved on board the drifters at sea.

Scotland. 9) The food contents of the stomachs of the samples of herring examined are recorded.

10. Investigation of the migrations of herrings by means of marking experiments.

Sweden. 10) The migration of the herring into the Skagerak and Kattegat have been studied by continual hydrographic soundings and trawling experiments from November 1921 to March 1922.

11. Hydrographical observations to be made in connection with the biological investigations, where the fishing is going on, and on the spawning grounds.

England. 11) Hydrographical observations were regularly made on the presumed spawning grounds. (See also under Hydrography). In conjunction with the Air Ministry an experiment was tried off Lowestoft during the herring season in spotting herring shoals from the air. Three flights were made, but owing to the large amount of suspended matter in the sea in this locality it proved impossible to see the shoals.

Scotland. 11) Two special cruises were made to investigate the biological and hydrographical conditions associated with an abnormal incursion of Atlantic water into the northern North Sea. A report on the results obtained has already been submitted to the Council.

France. La limite méridionale du hareng au point de vue géographique a été déterminée par le Laboratoire de La Rochelle. Un exemplaire a été trouvé sensiblement en face de ce port. La limite du hareng en quantités susceptibles d'être pêchées commercialement est à peu près l'embouchure de la Loire.

Holland. No new investigations.

e. Sprat.

During the year 1921 the sprat investigations were carried out in conformity with those made in 1920.

Samples for measurement and age investigations were collected from most of the places where sprats were fished for. 83 samples were collected in all. Through these a comparatively good information was obtained as to the changes of the stock and the movements of the larger shoals, which in many instances could be distinguished through the different size and age compositions of the shoals.

In August—September a fortnightly cruise was made in the fiords in the neighbourhood of Stavanger with the same sprat carrier as the preceding year. During the cruise plankton hauls were made in order to investigate the occurrence of the food of the sprat. Special nets were used in order to get the larger sizes of the young sprat. Mostly though the information about the occurrence of the young sprat was arrived at by the samples from the sprat fishery, where the comparative numerical strength in many cases could be judged of.

The material collected has been partially worked out for a preliminary report delivered to those concerned in due time for the new season. The report will be issued in "Aarsberetning vedkommende Norges fiskerier" this year.

f. Cod and Haddock.

The programme of work for the various countries concerned are as follows:

England will conduct investigations on cod in the spring of 1922 on the lines laid down in paragraphs 1, 2, 3, 4, 12 and 13. Work under paragraph 10 and 14 will be taken in hand at once. A beginning will be made with investigations under paragraphs 6, 7 and 11 and these will be further developed next year. Work under paragraph 8 and 9 is already in progress. Any haddock data collected will be handed over to Scotland.

Scotland will continue the investigations on haddock according to paragraphs 6, 8 and 9 and will begin, as early as possible, a more intensive study of the lines laid down in paragraphs 7, 11, 1, 3 and 10. Any cod data collected will be handed over to England.

Denmark will undertake investigations regarding cod and haddock on the lines laid down in paragraphs 8, 9, 12 and 13 of the programme.

Holland does not propose to undertake any investigations in the ensuing year but is continuing an ecological study of some communities along the Dutch shore. In this connection the distribution and conditions of life of codlings will also be studied.

France will undertake investigations on the Newfoundland Banks and next year will send a naturalist to work amongst the fishing vessels on the Banks. France will pay special attention to the occurrence of cod and haddock at the southern limits of their range.

Sweden will undertake investigations regarding cod and haddock on the lines laid down in paragraphs 2, 12 and 13 of the programme.

Norway will continue the biological-statistical investigations in order to follow the fluctuations in the stock of cod along the Norwegian coast. The marking of coalfish will be continued.

Belgium is not at present in a position to carry out any investigations at sea and must restrain to coastal and lightship work.

1. Delimitation of Spawning areas by means of quantitative egg observations, particularly to the North of Scotland and towards the Fisher Bank in the case of haddock, and off the N.E. coast of England in the case of cod.
2. Study of the physical and hydrographical conditions in the spawning areas.
3. Determination of the dispersal of larval and post-larval stages.
4. Study of the food of larval and post-larval stages, in connection with the collection of microplankton and nano plankton.
5. Study of the natural causes of mortality in larval and post-larval stages.

England. 1—3) Cod eggs were collected in April on lines from Spurn Head —Great Fisher Bank and Tyne—Spurn. Very few were taken. It was possible that the voyage was not undertaken early enough to catch the larvae before they drifted away from the spawning-ground. At stations where eggs were taken in the quantitative net, a haul with the PETERSEN trawl was made, and the eggs obtained kept alive until they reached a stage of pigmentation at which they could be identified. This enabled the proportion of cod and haddock eggs present to be ascertained.

4) Plankton samples were taken concurrently with egg collections on the above mentioned cruise.

Scotland. 1—5) Owing to the incidence of the season coinciding with the temporary lack of a research vessel, Sections 1—5 of the programme, dealing as they do with the delimination of spawning areas etc., have not yet received attention, but records of previous spawning seasons are being systematically worked up.

Norway. During the year 1921/22 the following work has been carried out:

Measurements of samples of cod have been collected on a large scale through the whole of the winter-season at a series of convenient spots along the whole of the coast where spawning cod (skrei) is fished for, and during spring at several points in Finmark where younger fish is obtained. The following number of measurements has been obtained:

Finmark	26.792	cod
Lofoten	12.151	-
Southern Norway	5.087	-

Of haddock about 5.900 have been measured in Finmark.

Scale-samples have been collected from both species in sufficient numbers.

In March-April a small fishing vessel was hired for a cruise in the Lofoten waters in order to investigate the hydrographical conditions obtaining during the skrei-fishing. Three sections, viz: one across the mouth and one across the narrow, northern part of the West Fjord and one section along the whole length of the Fjord were repeated thrice. The hydrographical elements considered were temperature, salinity, oxygen saturation and alkalinity. Water samples for counting the

micro-organisms were also taken and closing nets for micro-plankton were employed on each station. The surface was fished for fish fry and animal plankton.

It is intended to repeat this investigation of the Lofoten waters for at least six years in the hope that thus may be got an insight into:

1) The reason why the fish shows marked predilection for a certain part of the possible spawning area, one year keeping mostly to the eastern, another mostly to the western part of the Lofot bank.

2) The fluctuation in the effective richness of each year-class of fry, whether this is due to the presence or absence of suitable food for the fry at the time the bulk of eggs begin to hatch.

6. Fishing for early bottom stages with finemeshed nets, or covered nets, to determine area of distribution.
7. Quantitative hauls with standard gear at centres of density, to determine variation from year to year in the abundance of the first and second year groups, with a view to investigating whether there is any connection between the numbers of such young fish and the subsequent catches of larger fish by commercial vessels. This is of special importance in the case of haddock and may not be feasible with cod.

Scotland. 6—7) Quantitative hauls with standard gear have been made at various centres with the object of census work on the various year broods. In this relation, the covering of small-meshed net on the cod-end of the otter trawl was used at those localities where the youngest year classes were likely to be present.

8. Measurements at sea on commercial vessels of unselected catches of cod and haddock distinguishing retained and rejected.

England. 8) Measuring work at sea on commercial trawlers has been continued by a staff of 8 or 9 measures. Haddock data are sent to Scotland in exchange for cod data.

Scotland. 8) Four Fish Measurers have been working regularly at sea on commercial vessels and the records obtained are abstracted as arranged by the English Department.

9. Study of market statistics.

Denmark. 9) The distribution of Haddock in the North Sea has been studied for two years (1913 and 1919) by means of distribution of catch in the new rectangular areas.

England. 9) The distribution of cod in the North Sea has been studied by means of the statistical returns, arranged in the new rectangular areas. This treatment has yielded definite results as to both the distribution and movements of the fish, which alone would be adequate to justify the change of system.

10. Study of the food and feeding habits of cod and haddock. Competing species.

Condition of nourishment. Quantity of food available in a selected area.

England. 10) The bottom fauna of an area on the Dogger has been investigated by means of the PETERSEN grab. (See also under Plaice Committee). Many stomachs have been examined and the contents identified. Special gear is being evolved to take quantitative hauls of the larger freely moving animals forming part of the cod's dietary.

Scotland. 10) In a large number of experiments, the stomach contents of the haddocks caught have been determined on the research steamer, but in addition a fair number of samples of stomachs from various size groups have been preserved and brought to the Laboratory. At the same time, similar methods have been adopted with regard to possibly competing species found on the same grounds. The dredge and small trawl have been used to ascertain the quantity and quality of food available on the various grounds.

11. Study of methods of age determination, in conjunction if possible with tank experiments.

England. 11) A beginning has been made with the study of cod scales in conjunction with the PETERSEN method of age-determination.

Scotland. 11) Attention has been devoted to the study of methods of age determination in view of its cardinal importance. Scales from representative samples have, as far as possible, been taken periodically from each area for age determination. The early year groups have been easily defined, so that a relatively small proportion of fish under 30 cm now require to be scaled. Work is now being concentrated upon defining the older groups whose representatives are all scaled for examination. A batch of Norwegian scales has been worked through and the study of racial characteristics is being developed.

12. Determination of size and age at first maturity, particularly in cod.

England. 12) Observations on maturity were carried out at sea both on the Research Ship and on commercial vessels, and on shore; a naturalist and a measurer being detailed for service on the North East coast for this purpose.

Scotland. 12) All cod material is handed over to the English Department.

Denmark. 12) Some age determinations of cod have been made.

13. Study of the migrations of cod and haddock including marking experiments with mature cod.

Denmark. 13) The pre-war marking experiments with cod in the North Sea, Skagerak, Kattegat and the Belts have been worked out.

England. 13) Cod were marked and liberated from the "George Bligh", and also from a motor coble on the Yorkshire coast. They were measured and marked either below the dorsal fin or on the operculum, and scales were taken

from the fish for the purpose of age determination. About 700 were thus dealt with and the returns have been good.

14. Experiments with savings trawls.

England. 14) A few comparative hauls have been made with the ordinary otter trawl and a trawl with large meshed baitings. These experiments will be extended next year.

16. Diseases and parasites of cod and haddock.

Scotland. 16) The effect of common parasites, if any, on the regularity of scale growth is being studied with special reference to the common *Lernaea*. So far, tank experiments have not been employed, but it is hoped to make a start with next year's brood.

Other work:

England. Material assistance has been afforded to investigators working at the Lister Institute, and at University College, on the vitamines in various tissues of the cod, livers and roes being collected and forwarded under proper conditions to the investigators.

Holland. No new investigations.

Sweden. Researches have been made on the cod both in the Baltic and the Skagerak, on the haddock in Skagerak and Kattegat, but these researches are not ripe yet for publication.

Ireland. Trawling investigations, to elucidate the size and distribution of young hake, were made on the south and west coasts of Ireland. Over 800 hake have been measured, and their sex and food, in most cases, determined.

France. Conformément à ses engagements la France a envoyé à bord du croiseur "Cassiopée" le Dr. LE DANOIS qui a accompli une mission de recherches sur le Banc de Terre Neuve en mai et juin 1922. Les résultats de cette mission seront ultérieurement publiés.

g. Plaice.

Belgium. Les résultats des recherches Belges confirment ceux de nos investigations de 1910 et tendent à établir:

1° que le voisinage immédiat de la côte de Belgique ne constitue pas une nursery importante pour la plie,

2° que la perte que subirait la pêche littorale par suite de l'adoption d'une taille minimale de 25 centimètres ne serait pas considérable,

3° que l'interdiction de la pêche pour les chalutiers à vapeur ou à puissant moteur dans la partie orientale du Sud de la Mer du Nord ne causerait pas un dommage considérable à ce genre de navire et ne pourrait qu'influencer favorablement la petite pêcherie littorale dans cette région.

Denmark. 1) Systematic fishing experiments have been carried out along the Danish coast in order to procure informations as to the frequency of young plaice as compared with that in the pre-war years.

2) Age determinations of plaice from the North Sea, Skagerak and Baltic waters have been carried out.

3) Measurements of plaice landed by Danish fishing vessels from the western Baltic have been undertaken.

4) Racial studies of plaice from the Baltic waters have been undertaken.

5) Collection of plaice eggs with HENSEN's egg-net have been carried out in the Belt Sea.

6) Marking experiments with plaice from the western Baltic have been undertaken.

7) An experiment with transplantation of 6000 plaice from the North Sea to the Lesser Belt have been carried out. 600 specimens were marked.

England. New work on the plaice has been limited to the research on bottom fauna described below, but measuring work at sea has been continued on a similar scale to last year.

Progress has been made with writing up the results of the 1920—21 intensive study of the plaice. A report on the age and maturity determinations is practically complete, and much has been done on the commercial statistics and measurements at sea. A report on the plaice eggs collected during the spawning season 1913—1914 has been submitted for publication and the data obtained during the season 1920—21 have been tabulated. The egg production has been calculated by the methods used for 1913—14 data, and it is thus possible to compare the egg production of these two seasons. For the period December 18th to February 13th, the egg production of 1920—21 was very nearly twice as great as in 1913—14. This is without allowance for temperature, which will make the difference between the index numbers still greater.

The otoliths of 1920 plaice caught in a continuous line of hauls with the otter trawl, extending from the Leman ground to within a short distance of the south end of Texel Island, were collected in May 1922 for comparison with similar collections made along the same line in May 1906 and May 1920. The otoliths have been stored for future examination.

Examination of the measurements made to March 1922 has been commenced with a view to comparison with the years dealt with in the Provisional Report. An increase of small plaice is very evident during the summer months of 1921. A small amount of material is available for the comparison of the size composition of the catch of trawl and seine, but at present is inadequate for a firm conclusion: there are, however, definite indications that the smaller fish escape the seine.

In a general sense the catch per 100 hours fishing during 1921 is markedly

lower than that during 1920 in the North Sea, notwithstanding a decrease in total trawling in the later year.

A considerable amount of work has been carried out with the PETERSEN bottom sampler, principally in a selected area on the Dogger Bank with a view primarily to finding out the amount of plaice food present. In 1921 this area was sampled on three occasions in August, September and November, a total of 200 stations being worked. The results, especially with the larger 0.2 m^2 grab, have been encouraging, and will be of great importance should transplantation of plaice be carried out in the future. The stomachs of plaice taken in the area have been examined. Hauls were made in 1921 in other localities to the number of 67.

In 1922 intensive work was continued on the Dogger and in the vicinity of the Haaks Light vessel, these grounds being typical plaice grounds of varying character. The PETERSEN grab was used at carefully arranged stations one mile apart, with numbered 189 and 58 respectively on the two grounds mentioned. The work was interrupted by loss of gear: it is intended to extend it to the Leman Ground.

In addition, further stations were worked on the Dogger with a view to delimiting a patch of *Spisula subtruncata*. The patch proved to have an area of at least 38 square miles, with an average of 375 and a maximum of 3000 individuals per square meter.

The results will, it is hoped, contribute towards determining the intensity of work with the grab necessary adequately to sample the ground.

A report by Dr. BLEGVAD, Assistant at the Danish Biological Station, on the results of the bottom sampling cruise carried out by the "George Bligh" from Lowestoft to Esbjerg in July 1921, has been published by the Zoological Society of London (Proc. Zool. Soc. 1922, pp. 27—32).

Scotland. In Scotland, investigations on the same lines as those carried out in previous years have been continued, this course being considered advisable owing to the adoption of the seine-net by Scottish fishermen.

During the year 1st July 1921 to 30th June 1922, the Moray Firth was visited five times and the grounds off the Aberdeenshire coast were surveyed on four occasions by the research vessel. All plaice captured were measured. Otoliths were extracted from approximately 4.400 fish taken in the first mentioned area and more than half of these have been examined. The second area yielded nearly 1.800 otoliths, the examination of which has been completed. From the data procured there seems to be a marked difference in the rate of growth of the younger fish from the two areas. The average sizes of the lower age-groups of the Moray Firth fish appear to be considerably less than those of the fish caught off the Aberdeenshire coast.

Over 2.000 very small plaice (1.800 below 14 cm) were caught in the course

of the operations from the Board's motor boat "Enid" in the waters of the Inverness Firth during the winter months. The lengths of all those were obtained, while 1.100 otoliths have been examined. It was hoped that this sample would be representative of the very earliest year-groups, but the results so far appear to indicate that the growth rate in this area is extremely slow.

No further marking experiments were made during the period and the records of the 1920 experiments are now being dealt with.

Scotland. *Lemon Sole.* Investigations into the rate of growth of the Lemon Sole have been continued. A number of fish have been marked and liberated, a scale being taken from the fish before liberation. Data is thus being obtained which will be of considerable interest to the question of age determination by means of scale rings.

Holland. The examination of the stomach contents of young plaice from the Texel-shore has been continued in order to study the variations in the food supply from year to year.

Sweden. Marking experiments on plaice in the Swedish fiords have been made in order to ascertain the life conditions of this species of fish in inshore waters. The result is: that the plaice in the fiords of Skagerak and Kattegat grows rapidly up to a size of 28—32 cm. length and then emigrates from our fiords when ripe for spawning. One of the marked plaice has been caught in the North Sea at the Frisian coast. This is probably the greatest distance covered by a marked plaice hitherto known.

h. The Committee of the Atlantic Slope.

France has worked out a special report.

England. The English share of the programme was carried out by the staff of the Marine Biological Association of the United Kingdom, as follows:

Hydrographical stations worked in connection with programme of Atlantic Slope Committee from April 1921 to July 1922.

1921.	April 26	Stations	E1.
	May 26 and 27	—	E1, L1 to L6.
	July 2 to 4	—	E1, E2, E3, N1, N2, E7.
	August 12	—	E1, L1 to L5.
	— 15	—	E1, L1 to L5.
	— 16	—	E1.
	— 22 and 23	—	L1 to L3 and six additional stations towards Falmouth.
	September 1	—	L1 to L5.

1922.	September 6.....	Stations L1 to L6, E1 and E2.
	— 15.....	— L1 to L6, E1.
	October 18.....	— L1 to L6, E1.
	November 9.....	— L1 to L6, E1, E2, E3, (surface only) E6, E7, N2, N3.
	December 1.....	— L1 to L5.
	— 7.....	— L1 and 8 stations in Bigbury Bay.
	— 12.....	— L1 to L6, E1.
	January 11.....	— L1 to L6 and E1.
	— 16.....	— L1 to L3 and four auxiliary stations.
	February 6.....	— L1 to L6 and E1.
	— 11.....	— L1 to L6, E1, E2.
	— 12.....	— E3, N1, N2, E7, N3.
	March 15.....	— L1 to L6 and E1.
	— 29 to 31	— L1 to L6, E1, E2, E3, N1, N2, N3, E6.
	May 22 to 25.....	— L1 to L6, E1, E2, E3, N1, N2, N3, E6.
	July 11 to 13.....	— L1 to L6, E1, E2, E3, N1, N2, N3, E6.

Ireland. The programme of investigation confirmed at the meeting of the 21st July, 1921, has been carried out as far as possible, and cruises have been made in the Area allotted to Ireland on the following dates, in 1921 August 22—23 (14 stations), September 15—16 (4 stations), October 3—4 (7 stations), November 7—9 (14 stations), and 1922 March 7—9 (11 stations), April 18—20 (14 stations), June 20—22 (7 stations). The hydrographic results have been communicated to M. LE DANOIS for collation with the French observations and inclusion in general report.

A report on the microplankton collection made during these cruises has, by permission of the Scottish Fishery Board, been drawn up by Miss Ogilvie, of University College, Dundee, and submitted for inclusion in the report of the Atlantic Slope Committee.

Macroplankton collections have also been made on the same cruises and the results are now being worked out.

i. Baltic Committee.

Denmark. Marking experiments with plaice and measurements of plaice and turbot have been carried out in the true Baltic in the neighbourhood of Bornholm.

Current-measurements have been carried out from the lightships "Schultz's Grund" and "Skagens Rev" during one month in the summer 1922.

Finland. Preparatory works were agreed upon for the re-organisation of the fishery statistics.

1921. July. Res. IV. A short cruise in the Bothnic and in the Gulf of Finland was made in November 1921. A cruise of 52 stations in the Gulf of Finland, northern Baltic and the Bothnic was carried out from 26 Mai to 8 June.

1921. July. Res. V. Observations of salinity, temperature and currents on 10 lightships in time with water without ice and of salinity and temperature in the whole year at 27 coastal points are made in the surface and at different depths three times daily, daily, six times and three times in the month.

1921. July. Res. VI. From 18—29 July continuous observations of currents, salinity, temperature, oxygen, carbonic acid, alkalinity, hydrogen-ion, in different depths were carried out from the lightship Storbrotten in the Southern Quark and from the motorship "Aurelia" at anchor east from Åland (near Jungfruskär). At the same time provisional supplementary mareographs were working at Jungfruskär (east) and Hellman (west from Åland). On Jungfruskär were made observations of evaporation and insolation and other meteorological elements. From S/S "Nautilus" continuous currentmeasurements and traditional thalassological determinations were carried out at different stations and different depths (esp. 3 days in the deep channel of the southern Quark and three days in the deep channel of Skiftet east from Åland).

1921. July. Res. VII. Observations from the stations named in Res. V. will be sent for publication.

Sweden. Svenska Hydrografisk Biologiska Kommissionen has from July 1921 to July 1922 executed:

3 expeditions in the Southern Baltic in order to study the hydrographic conditions of this part of the Sea, (two expeditions in August—September 1921 and one in March—April 1922) and their influence on fishlife. The hydrographic as well as the biological investigation has been carried out in every detail according to modern principles. New rich fishing grounds have been discovered South of Skåne and East of Bornholm.

One expedition in common with the Finlandish Thalassological Institute in the Åland Sea in order to study the interchange of waters (by current-measurements and hydrographic observations of different depths) between the Baltic proper and the Bothnian Sea (July 1922).

A study of the hydrographic qualification of the different waterlayers in Skagerak, Kattegat and the Baltic by a series of hydrographic deepsoundings in the deepest part of these Seas (in September, April and July).

k. Eel Investigations.

Belgium. Des pêches au filet fin de PETERSEN ont été faites en vue d'évaluer chaque année la quantité de jeunes anguilles arrivant de la mer et pénétrant dans les rivières et les ports. Leurs résultats indiquent que la montée sur notre côte est sujette à variations et n'a pas été abondante cette année.

Denmark has carried out eel investigation on the Dana Atlantic expedition.

England. Four samples of elvers collected at fortnightly intervals during the run of elvers at Epney-on-Severn were sent to Dr. SCHMIDT in July. Two samples of eels from Windermere and Lymington respectively have also been obtained for Dr. SCHMIDT.

Records of the ascent of elvers entered on forms issued by the Ministry for distribution to river Conservators and others have been received from the Rivers Dee, Eden and Teify. The records have been sent to Mr. STRUBBERG at Copenhagen, for Dr. SCHMIDT.

l. Limnological Section.

The programme of work for the various countries concerned are as follows:

In **Holland** investigations on the life history of Coregonus, salmon and seatrout will be undertaken in continuation of the work done in previous years. A report on the plankton of the estuaries of the Rhine will be prepared.

Ireland will continue work on lake-plankton and the life history of Coregonus.

In **Denmark** investigations on the life history of salmon and seatrout will be continued in connection with marking experiments. New investigations on the biology of Coregonus will be instituted.

In **Sweden** material for the study of Coregonus will be collected. The work begun on salmon will be continued.

France will make researches on the life history especially growth and migration of Alosa and Acipenser following the same lines as those agreed upon by the Limnological Section.

In **Finland** investigations on Coregonus and salmon and on the plankton in fresh and brackish water will be continued as indicated in the programme above.

Denmark. Marking experiments with Sea Trout and age-determinations of Salmon, Trout and Coregonus from various Danish rivulets have been carried out.

Ireland. The work of the Limnological Laboratory on Lough Derg has been continued, and the distribution of the Phyto- and Zoo-plankton has been regularly observed, and its quantity estimated throughout the year. Investigations have been extended to other lakes in the neighbourhood. Further observations on Coregonus have been made in the Lough Derg.

The marking of salmon and the collection of salmon scales from selected rivers has been continued.

Finland. Investigations of the composition of the year-classes of *Coregonus albula* have been carried on in the lakes Keitele, Nilakka and Pielavesi.

Investigations of the salmon have also been carried on in the Uleå river at the Bothnian Bay and in the Kymmene river at the Finnish Bay and have during the summer 1922 been extended to the Kemi river in the northern part of Finland.

Holland. An intensive study of the plankton of our brackish-water has been undertaken; a report by Dr. REDEKE, Miss G. DE LINT and Dr. VAN GOOR: "Prodromus eener flora en fauna van het Nederlandsche zoet- en brakwaterplankton" including the plankton of the estuaries of the Rhine was printed.

Extensive investigations have been made on the life history of young salmon and trout in the brooks of the most southern province of the Netherlands (Limburg), including age-determinations and food-supply.

Sweden. No researches on Coregonus, but salmon work continued from previous years.

France. Les recherches indiquées ont été effectuées par M. le professeur ROULE qui a remis au Comité Limnologique deux notes sur ces questions.

m. Professor Joubin's recommendations in regard to Molluscs.

England. 8—9) A report is being completed by Dr. J. H. ORTON of the Plymouth Laboratory on the results of the investigations carried out by him during the past year on the oyster mortality in England.

These investigations into the cause of the abnormal mortality amongst oysters have now been handed over to the Ministry. Samples of sound and "hockley" (sick) oysters have been forwarded to the Laboratory from Whitstable weekly since May 4th. The leucocytes of the blood are examined to see if any change takes place with regard to the proportion of the different kinds, or in their structure, inclusions etc.; bacteriological examinations will also be carried out.

Work has been carried out also at the Millport Marine Laboratory on the effect of the oil found in considerable quantity, on or near the oyster beds of the Thames Estuary.

10) A preliminary survey of the South Wales oyster beds has been carried out at the request of the South Wales Sea Fisheries Committee. The object of the examination was to determine the present condition of the beds, and to formulate recommendations for the re-stocking them, as they have become much depleted.